JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

Security and Unity of Gas Undertakings.

LAST week Sir George Livesey faced the proprietors of the two neighbouring Southern Gas Companies which have so much in common—the South Metropolitan and the South Suburban. As usual, his addresses, on both occasions, were rich in suggestions to gas administrators and in that form of encouragement which sends proprietors away with fortified assurance as to the future. Security begets confidence; and nearly all Sir George had to say at both meetings is concentrated in that one word "Security." Indirectly, the message to gas undertakings is "Make yourselves secure;" for from security springs the confidence of proprietors and the closer attachment of consumers and workpeople. The secure company "grows strong and great in substance and "in friends." To make the South Metropolitan and the South Suburban Gas Companies secure has long been the policy of the two Boards, as of many others, but not unfortunately of all. Sir George, at the meeting of the South Metropolitan proprietors, said the policy of the Company has always been to consider the interests of the consumers first and foremost. We are not going to cavil over the construction or the literal interpretation of this statement; but it may be said with equal truth that, by following the policy of considering the interests of the consumers, the Directors are giving "first and foremost" consideration to the interests of the proprietors. We know of no better way within the bounds of reason. All that can be done to reduce the price of gas is to the interests of the consumers; and the attainment of a low price forms the barrier which keeps competitors at bay. It increases stability; and it assures a continuity of prosperity, so far as it is humanly possible for such assurance to be given.

There were at least half-a-dozen roads that Sir George (taking the two meetings together) pointed to which open out in security. It is not pretended that these comprehend the whole; but they are contributory—one or two of them being of paramount importance. They are: The removal of impositions which compel the supply of gas of a quality that modern improvements and conditions have rendered void and useless; the giving of the greater part of the advantage gained to the consumers in the form of reduced price of gas; the resistance of outrageous demands on the part of coal owners; the combination of the gas industry to realize better prices for tar; the protection of gas undertakings against detrimental market operations in connection with thorium; and the giving to industry a palladium against the turmoil—petty and great and bitter—which is almost inevitable where there is an interdependence of capital and labour without the recognition of any community of interest. The question of the abolition of slavery to uncalled-for restrictions was touched upon at both meetings, and to the larger extent at the South Suburban meeting, seeing that this is the first opportunity that the Chairman has had of directly informing the proprietors of what is practically the completion of the legislative programme which the Company laid before Parliament in 1903, and which it has taken four years to realize. No one in 1903 was aware of the precise course that gas legislation would take in immediate sessions. There have been certain deviations from the expected; but the whole effect so far has been that sought and zealously contested for. Explanation has been previously made in the "JOURNAL" of what the South Suburban Company have secured by their unique struggle, carried on with the consciousness that what was asked for was right; and the further explanation that Sir George has given to the proprietors is pervaded by the additional interest that comes from his inner knowledge. Incidentally, readers will mark the reference to the variation that has been made in the sliding-scale in the South Suburban Act.

In attaining to great security, the price of gas is, of course, pre-eminently important; and whatever lines of policy are pursued in enhancing security, they all converge to the one point of the price of gas. Coal has, roundly speaking, increased about 1s. per ton. But, nevertheless, the South Suburban Company, enabled by the savings produced by the new conditions under which they will now work, announce a reduction of 1d. per 1000 cubic feet; and the customers of the South Metropolitan Company will find in the proceedings at the meeting of the proprietors nothing that foretells an increase in the price of gas from the popular figure of 2s., to which it was reduced two years ago. As was intimated when dealing with the report and accounts, the reduction to this figure has almost depleted the undivided balance, as events did not turn out exactly as anticipated. But to pay the dividend for the past half year, there is happily no occasion to trench on the remnant of the undivided balance; and there is to-day an encouraging ring about the Chairman's remark that even if they could have seen the course of events two years ago, they would still have reduced the price to 2s. That price is a great security. Looking round the south of London, we cannot find a single electricity undertaking—company or municipally administered—that can be truly described as prosperous. How much this is due to the cheapness of gas, we need not trouble to inquire. The 2s. price, Sir George asserts, can also compete with suction or other producer gas for power, without giving the user the trouble of being his own gas manufacturer, and running the risks of breakdowns of plant. Sir George, however, still clings to his inveterate opinion that it is quite unfair to make special reductions to large consumers of gas for power purposes. He is in a position to do so, with gas at 2s. per 1000 cubic feet. Where gas can be supplied at a price sufficiently low to compete for all purposes, there is, of course, no necessity for rebates, and the request for them can be rejected with impunity. But where it cannot be, which is the best policy in the interests of the undertaking and of the small consumers—to forfeit the large business or to retain it, not by supplying at below the cost of production per unit of output as in the case of electricity, but by supplying at a small profit, which in the total will be of assistance to both the undertaking and the consumers alike? Competition does not allow of inflexible rule in all cases. We are not now dwelling in the olden days when 25 cubic feet of gas were required to get the illumination of one $3\frac{1}{2}$ cubic feet incandescent burner; but no such ratio of economical progression has been made in the application of gas for power purposes. In buying material, plant, and appliances, a large gas undertaking—the South Metropolitan Gas Company are not, we take it, an exception to the rule—expects to get some concession. The extensive user of gas entertains similar views; and, unless the common price gives him better value than anything he can obtain elsewhere, he will have a rebate or transfer his custom, which may then be irrecoverable. If it is unfair to make allowances to large consumers, then it is equally unfair to charge prepayment consumers anything per 1000 cubic feet beyond that necessary to pay the equated capital charges on their installation.

The price of coal also came in for some mention at both meetings. The South Metropolitan Company (as was calculated when noticing the Directors' report and the accounts) are paying about 1s. extra per ton under their new contracts; and the price has been advanced by an "appreci-"able amount" in the case of the South Suburban Company. In unity there is strength; and Sir George again appeals to gas undertakings—if precedent is to be followed by the coal owners—to unite in resisting any attempted outrageous advance next year. The question of tar was also a prominent one at the South Metropolitan meeting. Sir George introduced it at the meeting of the Institution of Gas Engineers; and, in a brief comment on the suggestions then made regarding the cultivation of new outlets, it was urged in these columns that effective good could only be attained

by gas undertakings "pulling together." Sir George has a vision of such co-operation in endeavouring to enhance the price of tar; and it is devoutly hoped the dream will take material shape. We do not like the truth that is enveloped in Sir George's description of gas undertakings merely constituting "a rope of sand;" and the sooner it is not true, the better will it be for the gas industry. It must be conceded by all that the most rapid progress in sensible gas legislation has been made since the three Metropolitan Companies presented a united front to Parliament; and what a front could be presented by the unity for the common good of all the gas undertakings in the Kingdom! It may be suggested to Sir George that he should go on dreaming of this matter for a while, and then tell the gas industry whether there is not something more than the one—though highly important—question of tar in it. At the moment, the price of tar is under consideration; and the question is the finding of new outlets—the two suggested being road making and fuel. We have just come across splendid samples of tar-surfaced macadamized roads at a southern seaside resort, and learn that drivers there prefer them to other forms of road paving, as horses get almost as good a footing on them as on untarred roads, motorists and cyclists find them a protection to their rubber-tyred wheels, pedestrians are not distressed by flying dust, and the hedgerows where the road surfaces are tarred are not made hideous by a coating of dust. So the roads thus treated please almost everybody. There is one warning. The suggested new outlets are not the directions to look for higher prices for tar. They are simply the means to an end. The direction in which to look for a higher price is that where the utilization of tar is richly productive of profit; and it is even more so in other countries than our own.

The next point of security referred to at the South Metropolitan meeting was that of monazite sand and its valuable product, thorium. The Chairman was able to show the falsity of the prophecies made as to the failure of the Company's investment in monazite. They can now obtain thorium at a price that will enable them to manufacture mantles at a cheap rate; and partly through the present low price of thorium, partly from their own property, and partly from another source, the Company have secured for themselves sufficient thorium to satisfy their requirements for, it is estimated, a great deal longer than ten years. At both meetings, again, the security afforded by co-partnership came into prominence. It is also a gratification to find Mr. John Mews adjuring the proprietors of the larger Company to consign to the waste-paper basket or the fire suspicious-looking gas company prospectuses and circulars attractively rich in promises to investors. Examples have had great circulation, and are well known; but warnings are necessary.

Glasgow Corporation Gas Affairs.

The great Corporation Department which has charge of the supply of gas to the community of Glasgow has not for a number of years shown to better advantage than it does in the accounts for the year ending the 31st of May, which were submitted to, and adopted by, the Town Council last Thursday. A year ago, a sort of back-wash was experienced, in the shape of a deficit of £12,055 on the year's working. This may or may not have been a result contemplated, though the probability is that it was not, because of the distaste with which the word "deficit" is regarded by everybody. At the same time, there it nothing improbable in its being not altogether unwelcome, in that it enabled a too large surplus—amounting to £48,104—earned two years before, to be brought down. Indeed, that previous surplus, after all the whittlings which there have been at it, still exists to the amount of a little over £11,000. But if we leave previous years out of account, it is found that the working for the past financial period was such that a surplus of £1763 was earned upon it, and that, too, after the amount paid in interest had been increased by £2834, the amount of depreciation by as much as £22,043, and the sinking fund contribution by £11,514. These three sums, amounting to £36,391, are an additional charge on the profit and loss account—a large jump in one year. This is not the place for setting out a balance-sheet of the finances of the undertaking, but the figures given elsewhere, taken together with the fact that, despite the large additional outlays, a surplus was earned, bring out the result that the business is possessed of a very large measure of vitality, and is in the hands of gentlemen who understand financing.

Of course, the financial side could not have been the success it was without the aid of the practical side. Rather, it was the excellent results obtained in the practical working of the undertaking which made the financial success. In the working, as compared with the preceding year, the revenue increased by £31,994, and the expenditure decreased by £8756—surely a test of good working. The greatest improvement in revenue was from coke, which advanced in price by 4¾d. per ton. It is not a far stretch of the imagination to suppose that the improvement in price was a matter of design; the easier price of coal making it possible, by taking less gas out of it (which was in reality the case), to keep up the quality and so command a ready market. But with reductions in price, there were increases of revenue from gas and also from tar and liquor, owing to the greater quantities produced. The quantity of the two latter products is not given; but in the case of gas, the increased sale amounted to upwards of 145 million cubic feet. The reductions in price of gas consisted in the concession last year of 3d. per 1000 cubic feet for gas used for power and manufacturing purposes, and the reduction of the prepayment meter supply from 3s. 4d. to 2s. 6d. per 1000 cubic feet.

It is probably significant that the response to these concessions was an increased consumption, for the purposes named, of 137 million cubic feet of gas; the significance being that for lighting purposes there was a decreased consumption of 27½ millions. This would have meant a less consumption of gas all over; but gas supplied by contract, at the same price as for lighting—presumably for public lighting—came to the rescue, and brought up the quantity. This was only the fourth year in which differential prices were charged for gas; there being a dead-set for a long time against departing from the principle (followed since 1877) of having a low price and charging the same to all. The opponents did not recognize that the times had changed. But do not these figures prove the wisdom of the adoption of the forward policy? Domestic lighting would not, according to the results of the past twelve months, have helped the business; the spread of the incandescent gas-burner having doubtless put a check to the demand for house and shop lighting. Public lighting, on the other hand, is, it is manifest, returning to gas. Whether or not these assumptions be warranted, there is no denying that the concession of 3d. to power users and manufacturers has had a most salutary effect, and so has the great reduction made in the price of gas used through prepayment meters. The prices are continued for another year as they were last year. Had it not been for a rise in the price of coal, there is every reason to believe that a reduction would have been made, probably in more than one class. As it is, there seems good ground for the Gas Committee cherishing the expectation that a prosperous year is before them, for the demand for gas for industrial purposes is likely to go on. By this time the city must be pretty well saturated with the incandescent gas-burner; so that in the region of domestic lighting there may not be any further going back.

The average price of coal is given as a fraction over 9s. 7d. per ton; and it is stated that the return from tar and liquor was 3s. 5d. per ton of coal carbonized. From coke it works out at about 3s. 8½d. per ton. The return from residuals is thus, as near as possible, 7s. 1½d. per ton of coal carbonized; leaving to be made up from the sale of gas, so as to cover the price of coal, only 2s. 6½d. This is surely a handsome, if not a unique, return. It means that, with gas at 25d. per 1000 cubic feet, when 1200 cubic feet are sold the price of coal is covered; and as the yield of gas per ton of coal was 8500 cubic feet, there remain 7300 cubic feet—equal in value to 15s. 10d.—to meet all other charges of the undertaking.

We are accustomed to look upon the Provan works as the great works of the Corporation. So they are, in many respects; but as yet they only stand third in the matter of output—Dawsholm and Tradeston being both before them in point of output of gas. The possibilities at Provan are greater than at the other stations; and as the new works are developed, we may expect a further improvement in the already excellent working results realized there.

The Council unanimously approved of all that the Gas Committee have done, as well they might. In the presence of what has been achieved, the voice of cavil ought not to find a place; and if it was heard at all, it was only in a modest tone. There is a talk of adopting a new method of stating the accounts; a Committee having been appointed to

consider whether this can be done. The accounts certainly do not contain a full disclosure of the business of the undertaking; but that is in accordance with the method of administration, which is in the hands of the Gas Committee, who only report results to the Council. The same method of government is adopted in the case of Railway Companies and other large undertakings; and the probability is that the present system of accounting in the Gas Department of Glasgow will not be departed from.

Professor Silvanus Thompson on Illuminants.

THE British Association has been meeting in York this year; but the proceedings have not had a prolific yield in the technical branches with which the "JOURNAL" is associated. We have, however, to give welcome, among the popular lectures delivered on the Saturday of the meeting, to one by Professor Silvanus P. Thompson on the production of light. As expositions of popular science, these Saturday lectures (which are a feature of the annual meetings of the Association), as a rule merit their title, but not always. It is not every scientist or physicist who spends his days in the higher realms of work and thought seeking for hidden truths, who can descend to the levels of the people's understanding. Professor Thompson, however, it is clear from the abbreviated reports which have come to hand of his lecture, includes the gift of lucid interpretation of abstruse subjects among his high accomplishments. The lecture was admirable for its perspicuity; and it comes at a time when the public require greater light thrown from independent sources on the question of illumination. It is, however, to be deplored that the condensed reports of lectures of this character appearing in the public press are not prepared by someone who can appreciate the significance of details which are explanatory of the main parts of the theme. We fear that, in some respects, Professor Thompson has not in the published accounts of his lecture received the fullest justice. If this is a mistaken assumption, then the deliverance was incomplete in several points.

Notwithstanding the comparative figures which appeared subsequent to the historical part of the lecture, and in which figures the electric flame arc lamp came out conspicuously ahead of all other forms of lighting (a matter to which reference will be made presently), it is a satisfaction to have such a deliberate statement as this by Professor Thompson —largely discounting the superiority in respect of illumination—that "the greatest advance in late years has been "brought about by the improvement in incandescent gas-"lamps." And we may add that Professor Thompson shows plainly that, with all the progress that has been made by electricity, a great gulf remains to be filled between the illumination obtained, for a given expense, by the ordinary forms of electric lighting and incandescent gas lighting save in the case of flame arc lighting, which can only have a limited application, and the whole tale concerning which Professor Thompson did not tell, and the part that he did tell does not altogether coincide with practical experience. But confining ourselves for the moment to gas lighting, the eminent lecturer stated that ordinary incandescent gas lighting theoretically does not cost more than one-sixth of the expense of gas burned in old-fashioned flat-flame burners. It is not only so theoretically taking illumination as the basis, but it is practically the case, even if the cost of gas had remained at the figure at which it stood in pre-incandescent gas-burner days. Time has altered that cost. In the score of years that have passed since Welsbach gave to gas the service of thorium and cerium, and (as Professor Thompson shows) set back the advantage that electric light would have had, in point of illumination, over the batswing burner, the improvements in coal-carbonizing operations, the reductions of expense in other directions that the greater volume of gas production has brought in its train, and the action of the sliding-scale, have greatly widened the relative costs of illumination by gas, under the old and the new conditions. Accepting (although we maintain the utter inadequacy of the figure) that six times more gas was required of old to realize the same illumination as can be obtained now by the incandescent burner, that was six times the amount of the expensive gas of many years since, and not six times the cheaper, and in many cases lower illuminating power, gas of the present. So considered, the benefit to the gas consumer of the "greatest advance of late years," is intensified. Professor Thompson does not overlook the fact, too, that by the high-pressure system the cost is still further reduced; and he instances the Millennium light. But he does not appear, from the abridged reports, to have noticed that the Millennium system is not the only "pebble on the beach." This was a mistake, because the public may not be aware that there are several others, in which the gas or the air are supplied to the point of combustion at a higher pressure than normal, that there are the self-intensifying burners, and that there are other burners of design varying from the ordinary in which the duty procurable is immensely superior.

Now from the general to the particular. The figures that Professor Thompson gives as to the candle-hours procurable for 2s. by different forms of lighting (according to certain of the reports of the lecture we have seen) suffer in value from the absence of the unit cost of gas and electricity, nor does he give us any of that information which has a contributive importance in connection with the performance of both illuminants, nor are we informed whether the calculated figures are the results of personal investigation or are founded on particulars published by interested parties. However, the figures are (with a reservation in respect of flame arcs) treated here as being acceptable to Professor Thompson. Taking the candle-hours to be realized for 2s., the glow, the osmium, the Nernst, and the ordinary arc lamp are left well in the rear by incandescent gas lighting, as we have always maintained to be the case, though ridiculed by electrical journalists who have declined to receive the truth. The electric glow lamp is shown to be not very much better than the old batswing gas-burner—respectively 3745 candle-hours, against 2720 candle-hours. Pitting the glow lamp against the ordinary incandescent gas-burner, the relations are 3745 candle-hours and 12,500 candle-hours. The osmium-lamp only gives 7143 candle-hours; and the Nernst, 5882 candle-hours. Many incandescent gas-burners do better than the 12,500 candle-hours for gas; and in towns where the price of gas is 2s. and under, the figure would be much higher. However, the figures as they stand are luminous of the fact that, for interior or any other situation for which the electric lamps named are suitable, they have much to do to overtake the value afforded, at a given price, by incandescent gas lighting. Cost for cost, even the arc lamp cannot match the ordinary incandescent burner; the candle hours of the former for 2s. being only 10,000, compared with the 12,500 for the latter. But when the comparison is made with high-pressure gas lighting, as represented by the Milennium system (which is the proper comparison), the 10,000 candle-hours for 2s. of the arc lamp stand in relation to 25,494 candle-hours for high-pressure gas lighting. Electricians have only left to them the flame arc lamp, which can merely be used in special positions; and to this type of lamp Professor Thompson attributes 47,619 candle-hours for 2s. We can claim as against electricity for all incandescent gas systems superiority in candle-hours, save in connection with this one lamp; and we should like to know whether the figure for the lamp has been computed on the manufacturers' beautifully amplified returns for new lamps and on perfect trial conditions, or whether Professor Thompson has given the figure from his own experiments, conducted under practical working conditions. Whether he has or not, he does not seem to have told of the lack of both diffusive quality and uniformity of action, nor of the uselessness of attempting to obtain uniformity of illumination on economical lines by increasing the candle power at one point of illumination to realize diminished cost. Greater economy must now be sought for among the lower power lamps. That Professor Thompson spoke largely on hearsay evidence in dealing with flame arcs, is almost manifest by his statement that "this form of lamp is believed to possess "special penetrative powers in a foggy atmosphere." "Believed!" Professor Thompson should have seen the wan flame arcs in London in the dense fogs last winter; and if the belief is his own, it would have had a rude shock.

In another column of his table, Professor Thompson did an unkind thing in speaking of "Poison, cubic inches car-"bonic acid." It is difficult to know what he intends to convey by this. Poison to the lay mind means something that menaces life; and carbonic acid is only a positive poison when it exceeds a certain limit in the air. Professor Thompson would have done greater service by referring to the "products of combustion" or "impurities" if the word pleased him better. Gas has had an existence now for over a century; and the world has been much the better for it, and no one can trace any degeneration of the human race by its use. Gas was formerly burned in a

manner which, on the Professor's showing, yielded, on the expenditure basis of 2s., 536 cubic inches of carbonic acid; while the same quantity of gas consumed in the incandescent burner only yields 72·5 cubic inches, and on the high-pressure system 39 cubic inches, which are negligible quantities. This great improvement is always conveniently overlooked by electricians, when they have to fall back on the abuse of gas through the want of a better case upon the score of economy and efficiency. The flame arc lamp is credited with the emission of only 0·8 cubic inch of poisonous gas. How grateful the electricians will be to Professor Thompson for the statement, when practical men allege that the gases evolved render these lamps unfit for interior use, and headache is the experience of those who are compelled to be in places where they are employed.

In his concluding remarks, Professor Thompson showed the great latent possibilities in artificial illumination. His words are worth quoting as a conclusion to this comment: "We spend at present in Great Britain annually a sum of "from £10,000,000 to £20,000,000, according to various "estimates, in manufacturing for ourselves artificial light, "and 99 per cent. at least of this colossal sum is thrown away "on mere heat. What a fortune awaits the man who will "invent a practical luminescence lamp, giving light without "heat." From this remark, electricians will discern that gas possesses a vast amount of energy now lost upon which to work for greater improvement; but they, with us, will fear that the man is as yet unborn who will accomplish the invention of the lamp that will meet the Professor's great ideal.

Water-Slide Chandeliers.

THE unfortunate accidents that have recently happened through the continued use of old water-slide chandeliers are not to the interest of gas lighting; and it is high time that gas suppliers made some special effort to rid the houses of their consumers of these death-dealing survivals of a past period in artificial illumination. The greater use of wall-brackets and cup-and-ball jointed pendants, which are so safe, and demand little attention, no doubt causes a greater neglect than of yore, when water-slide chandeliers were commonly employed. Relief from attention in the matter of periodical watering in the case of the fittings of most rooms in a house, is apt to make one forgetful of the relic that is maintained in the drawing or dining room for its massive and artistic merits or its family associations; and it eventually becomes no one's business to occasionally replenish the water-seal. We recorded last week the proceedings at an inquest on a man who suffered the extreme penalty of the neglect of the chandelier, and whose widow confessed that she occasionally watered it "when she thought of it," and the last time she performed this operation was at Christmas. A brother of the deceased—a plumber and gas-fitter—also admitted that he had intended to water the chandelier, but it "slipped his memory." In another column are recorded the proceedings at an inquest on a Japanese visitor to Eastbourne, who was suffocated, while in bed at a boarding-house, through an escape of gas from a chandelier that had not been watered during the three-and-a-half years of the present landlord's tenancy. Thanks to the incrustation formed inside the slide, an earlier and—who knows?—perhaps greater disaster has been averted. But the first time the incrustation was fractured by the pulling down of the chandelier, there was the inevitable gas escape, and Ichymi Sugitachi, of the Japanese Consulate in London, was the victim. In sea-side boarding-houses, these antiquities are frequently to be found. The time was when the rooms of most of these houses were let as apartments; and when every visiting family had its own sitting-room, in which was the chandelier. Now many of these houses have been converted into boarding establishments, with common dining, drawing, and smoking rooms; and the erstwhile sitting-rooms are now bed-rooms, with the same old chandeliers, which ought on no account to be permitted to remain in sleeping apartments. They should be cleared out without compunction. As we have said, these fatalities through faulty chandeliers are not good for the gas industry; and we would suggest that a special attempt should be made to abolish them by the managements of gas undertakings in every town circularizing their consumers, and offering to supply and fix new pendants in place of chandeliers at cost price. Let them be cleared away as fast as possible; and in urging their removal, no hesitancy should be displayed in admitting that there is danger in their continued use.

Conciliation in the Coal Trade.

In another part of to-day's "JOURNAL" reference is made to the statistics with regard to conciliation in labour disputes which are contained in the last report on "Strikes and Lock-Outs in the United Kingdom," prepared by Mr. A. Wilson Fox, of the Labour Department of the Board of Trade. Allusion is there made to the large proportion of cases in the mining and quarrying industry which were settled by Conciliation and Arbitration Boards in the past year; and in this connection it is of interest to notice that there is every prospect of the Coal Conciliation Board for the Federated Mining Districts of England and North Wales (the object of which, of course, is the regulation of wages) being renewed on the expiry at the end of this year of the present agreement between the coalowners and the miners. Both parties are said to be fully agreed as to the great value of the Board in smoothing away difficulties, and in settling general wage questions. It is, however, believed that the men will require some concession before assenting to another agreement. As is well known, under the present arrangement (which was made some three years ago) there is a limit to the extent to which the Board can make changes in the rate of the men's wages; the minimum wage they can fix being 35 per cent., and the maximum 60 per cent., above the standard rate of 1889. When the existing agreement was made, the men desired the minimum to be put at 40 per cent., and the maximum at 70 per cent., above the 1889 rate; and it is thought that the men's representatives will again endeavour at any rate to get the minimum fixed at 40 per cent. During the whole of the time the agreement has been in operation, wages have not gone below this level (though twelve months ago the coalowners made an unsuccessful effort to reduce the rate to the minimum of 35 per cent.); and it is argued that the long period of time during which 40 per cent. has been the working minimum, justifies its insertion in the new agreement as the actual minimum under which future Boards shall regulate wages. At the recent quarterly meeting of the Board, a resolution was passed to the effect that the members were unanimously of opinion that it was desirable, in the interests of the trade generally, that the Board should be continued for a further period. The various districts are to be invited to consider this recommendation, and the terms on which the Board shall be renewed; and a meeting will be held to consider the result, which it is to be hoped will be favourable.

Trade Disputes Bill.

The Government Trade Disputes Bill—the object of which is to "Provide for the Regulation of Trade Unions and Trade Disputes"—has now emerged from the Committee stage; and copies of the measure, as amended, have been printed. The principal alteration is in section 4, which now reads: "An action against a Trade Union, or any branch thereof, whether of workmen or masters, or against any members or officials thereof on behalf of themselves and all other members of the Trade Union, for the recovery of damages in respect of any tortious act alleged to have been committed by or on behalf of the Trade Union, shall not be entertained by any Court: Provided that nothing in this section shall affect the liability of the Trustees of such Unions to be sued in the events provided for by the Trades Union Act, 1871, section 9." As originally in the Bill, clause 4 stipulated that Union funds should not be liable in respect of any tortious act by members in connection with trade disputes, "unless the act was committed by the Committee or by some person acting under their authority." That is a distinction with a very great difference; and should the Bill ultimately become law, this particular clause will be capable of giving rise to a very serious state of affairs. As Sir Edward Carson remarked, it practically says that "the King can do no wrong; neither can a Trade Union." Clearly this is a concession made by the Government to the Labour group; and time only can show whether or not it was a wise policy to give way on the point. If the Unions, and each individual member thereof, could be relied upon always to act with good judgment, after mature consideration of the probable consequences, both to themselves and to others, of anything they might do, there would be less cause for apprehension; but these bodies in the past have not invariably proved themselves entitled to have any such faith reposed in them. Believing, as we do, that the cultivation of a friendly feeling between the two parties offers the only possible means of satis-

factorily settling the "Capital and Labour" question, we should regret the passing into law of a Bill which would confer upon Trade Unions such immunity from retaliation as might very conceivably tempt them into actions which could have no other result than the embittering of the relations between employers and employed. A warning to which the latter would be wise to pay heed is uttered by the "Spectator," which, after admitting that the Unions may make no improper use of their power, adds that "a step has been taken which, unless retraced, may in time subject the community to a strife between Capital and Labour over which the law will have no powers of control, and—let it not be forgotten—in such a strife it is Labour that will go under."

Goole Gas and Water Undertakings.

The members of the Goole Urban District Council must have felt highly gratified at the report presented to them, at their meeting last Wednesday, by their Clerk and Accountant (Mr. James W. Johnson), and noticed in another column, on the financial position of the gas and water undertakings. There was a clear profit of £1953, notwithstanding the fact that the price of gas was 2d. per 1000 cubic feet less than it was in the preceding twelve months; and the addition of this sum to the reserve brought it up to £4153. This figure is the difference between a total profit of £14,466 realized since 1893 and £10,313 spent out of it on gas and water plant in lieu of obtaining loans. While the income on gas increased last year by £1171, the expenditure was only £254 more; and of this £130 was due to the greater amount of coal carbonized. In the case of water, an addition of £134 to the revenue is accompanied by a decreased expenditure of £126. It must be acknowledged that the figures are not large; but they are evidences of economical management on which the Engineer and Manager (Mr. T. G Franklin) deserves congratulation. He has shown that faithfulness over "a few things" which will, it is to be hoped, lead to his being made "ruler over many things." He increased his consumption to the extent of 15 per cent. in the twelve months covered by the report; and it may be presumed that there is room for a still further advance. At all events, we have the authority of the Clerk to the Council for the statement, as the result of his investigation, that "no better organized municipal gas and water undertaking exists in the country, nor one which is worked throughout, in all its branches, on more economical lines." The Council some time ago decided to separate the gas from the water undertaking, and have the accounts kept apart. It will now rest with the Manager to show that independently each department is able to pay its way.

Right to Support for Reservoirs.

In our "Legal Intelligence" to-day will be found the report of the judgment of the Court of Appeal in the action brought by the Manchester Corporation against the New Moss Colliery Company, to restrain them from working certain minerals to the damage of their land and works by subsidence. The defendants had in the course of their workings approached to within 40 yards of the plaintiffs' lands, and they had thereupon given notice to them, under the Water-Works Clauses Act, 1847, of their intention to work certain mines under or within that distance of the works. The plaintiffs did not state their willingness to treat for payment of compensation to the defendants, in respect of these mines, in the manner provided by the Act; and thereupon the defendants proceeded to work the mines, with the result that subsidences occurred. The plaintiffs had acquired part of the land on which the reservoirs stood from one Taylor. The purchase from him was by agreement; and by the conveyance all the subjacent mines and minerals were conveyed to the plaintiffs. The plaintiffs therefore claimed that, in respect of this land, they were in the position of ordinary owners in fee-simple, and were entitled to the ordinary common-law rights of lateral support without paying compensation. Mr. Justice Farwell decided against them, and they appealed. The case was argued before Lords Justices Vaughan Williams, Romer, and Cozens-Hardy, who allowed the appeal; holding that the effect of the plaintiffs not exercising their statutory rights to acquire the mines on receiving notice of the defendants' intention to work, was to remit them to their common-law rights, under which they were entitled to lateral support for their land. An injunction and inquiry as to damages were accordingly granted.

We regret to learn that Mr. Charles Nickson, the Superintendent of the Gas Department of the Manchester Corporation, has sustained a severe bereavement by the death of his wife, Mrs. Emma Nickson, which took place at his residence, Faircroft, Longsight, last Tuesday.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 472.)

THE Stock Exchange reopened on Tuesday after the Bank holiday in a fairly good mood, and with a disposition to take a brighter view of things. Business was not over-abundant, but some buyers were in evidence—a not very numerous class of late. The favourable tendency was pretty well maintained throughout the week, though not without some little degree of oscillation in one or two markets—Home and American Rails, for instance. On Friday, too, the usual move to realize took place; but the markets were not too debilitated to stand the strain, and the general firmness was almost unimpaired. In the Money Market, there was a good demand. But the supply was fully equal to all requirements; and it was only towards the close that, in view of the continued demand, the market stiffened. For discount, the rates followed about the same course. Business in the Gas Market was fairly active, considering the season; but towards the close, it gave signs of quieting down to low pressure. The tendency, however, was most favourable, and a large number of quotations of undertakings in all parts of the globe made more or less considerable advances. In Gaslight and Coke issues, the ordinary was only moderately active, but still quite strong. The opening bargain was at 99⅞. After that nothing was done below par; and the final mark was 100¾ (a rise of 1 in the quotation). The secured issues were hardly touched; the maximum alone being dealt in at 89 and 90. South Metropolitan was fairly busy, and in good demand. The opening deal was at 132¼, and on Thursday 134 was marked—a rise of 1 in the quotation. The debenture was done at 87 and 87½. Commercials were let alone altogether; but each of the capital issues advanced a point in quotation. The Suburban and Provincial group were almost unnoticed. Alliance and Dublin old changed hands at 21, Bromley "B" at 93, West Ham at 106½, ditto preference at 124½, and ditto debenture at 104¼. Brighton original gained a couple of points; and Wandsworth and Putney advanced in view of the approaching statutory dividends. In the Continental Companies, Imperial was strong and active. After opening at 179½, it pushed up to 183 (a rise of 2 in the quotation). Union recovered a point, but was not dealt in; and European part-paid changed hands at 18⅜ and 18⅝. Among the undertakings of the remoter world, Bombay new marked 5¼, Cape Town 15⅝ and 15¼, Melbourne 5 per cent. 103½, and ditto 4½ per cent. 103. Buenos Ayres was done at from 12¼ to 12⅛, Primitiva at from 6 13/16 to 7, ditto preference at 5¼, ditto debenture at 96¾, River Plate at 12⅝ and 12¾, and San Paulo at 14½ and 14⅝.

The closing prices are shown in our Stock and Share List on page 472.

ELECTRIC LIGHTING MEMORANDA.

Builders and Preferential Treatment of Electricity Suppliers—The Slow Increase in Consumption—Fires and the Asserted Safety of Electricity—Bristol under Investigation.

IT was not long ago that we raised the question in the "JOURNAL" regarding the preference that builders in many places are giving to the electric wiring of new houses; and a correspondent lately called attention to a case in which electricity distributors were making it a condition of supply—illegally we fancy—that gas should not be used on the premises. There are certain clauses in the General Acts, which provide a short and sharp way of dealing with the latter. No agreement can override the General Acts, which make compulsory a supply of electricity upon the application of any householder within fifty yards of the distributing cables. There is no proviso that the supply can be refused if gas is used on the premises. The arbitrary conduct of builders is another matter, though, in the end, they will find an implacable attitude on their part in this matter will not commend itself to their tenants. Householders who pay rent for a dwelling-place are not going to be dictated to as to the artificial light they shall use, any more than they will brook interference with their liberty as to what they shall eat and the fashion in which they shall be clothed. In time, tenants will set landlords right as to the extent of their controlling powers, by declining to be bound by them, or refusing to occupy their property. We are glad to see the protest that Alderman Gibson, the Chairman of the Manchester Corporation Gas Committee, recently uttered respecting the nature of the guarantee that the Electricity Committee of the Corporation have extracted from a builder who is about to erect 600 houses on the Burnage Park Estate. The builder has promised "not to put gas in for illuminating purposes;" and the Electricity Committee have, it seems, eagerly accepted this as a sufficient guarantee. The Chairman of the Electricity Committee (Mr. Howarth) asserts that the builder did this entirely on his own initiative. Out of his own mouth, Mr. Howarth gives denial to his assertion. The "initiative" regarding a guarantee—probably not the suggestion as to the nature of the guarantee—came from the Electricity Committee. The carrying of the electricity cables to the estate in question will involve an expenditure of £6000; and before the Committee agreed to supply the electricity, they asked for a guarantee that it would

be used. Therefore, how can Mr. Howarth say that the builder gave the guarantee on his own initiative? Gas will, of course, be supplied for cooking and heating; and the gas-mains being laid, the Gas Committee will be bound to supply for lighting purposes if desired by any householder. The detriment the Gas Committee will suffer will be that, if the houses are wired for electricity, householders will not care to have any disturbance of their rooms by piping them for gas. As Alderman Gibson complains, this is unfair and unreasonable competition as between one Corporation department and another; and we hope the Gas Committee will not tolerate it, but will persist to the uttermost point in getting gas introduced to the 600 houses in question. Some £50,000 a year is drawn from the pockets of the gas consumers at Manchester in relief of the rates, while the Electricity Committee do not contribute anything. It is an iniquitous system that puts every conceivable drag on one department (and that the most productive) to the advantage of another.

A considerable number of the annual accounts of the electricity departments of local authorities have been published lately; but they are so numerous that nothing more than a general notice can be made of them in an early issue. There are striking features about some of them which have a relationship, and to which attention may meanwhile be drawn. They are the continuous capital expenditure, the greatly increasing amounts required for sinking fund and interest, and yet the comparatively slow increase of business. Take Croydon as an example of this, without casting around for a worse illustration. Last year the increase in the number of units sent out was only 327,497, notwithstanding a reduction of price; but the interest and sinking fund charges went up by £2143. The Borough Electrical Engineer, however, is hopeful of a good continued increase of consumption. Where he looks for it we do not know, unless through the public establishments and street lighting. Certainly his experience of the use of electricity for motive power is not one for him to boast about, although he has the temerity to say that there has been "a gratifying increase in the number of motors connected to the mains, due to the lower prices charged, proving that the electric motor is becoming a favourite form of obtaining power for driving machinery." It is really marvellous how a powerful imagination helps one to gratification and a belief that all is well. For we read these words in a speech recently delivered by Alderman Miller, the Chairman of the Committee: With regard to motors they had now 382 horse-power motors. That was quite a respectable load"—that is, from Alderman Miller's point of view, which is not ours. Why could not the Alderman say the Department had now connected so many motors of a total horse power of 382? His way of presenting the statement, of course, looks better to the uninitiated. The condition of the motive power business, however, is not really a "gratifying" one for a borough of the size of Croydon; nor does that condition prove any favouritism for electricity on the part of power users. Then as to illumination, the Borough Electrical Engineer says something else, the full significance of which he does not apparently appreciate: "With the perfecting of several [?] new types of electric lamps which are now being placed on the market, and the consequent decrease in the cost of electric current required for these lamps, the use of electricity should increase considerably in the future." If reliable lamps could be secured which did not ail from all sorts of troubles, and were not so sensitive to conditions slightly out of the ordinary, there might be a little spurt through them in the obtaining of new consumers; and there might also be, for the sake of the lower wattage per candle power (which is so much desired), a larger adoption of the lamps among existing consumers ignorant of the low value to be obtained from them in comparison with incandescent gas-lamps, as illustrated by Professor Silvanus Thompson [see p. 449]. The change to the more economical lamp would in one sense be gratifying to electricity undertakings; in another, it would mean diminished consumption, which would have to be overtaken to keep up the revenue. There is the similar case of the incandescent gas mantle, which has had such a big effect in reducing the rate of the increase of gas consumption, seeing that one ordinary incandescent burner is equal in illuminating power to six and more old flat-flame burners, each consuming more gas than the single incandescent. The rate of increase, however, in the case of those gas undertakings that have been chiefly affected is now returning to greater figures, and will continue to do so, with mantles and burners far cheaper than metallic filament electric lamps (which have to be entirely replaced when anything goes wrong.) As consumption accelerating devices, the electric lamps in question will take a long time to produce any really appreciable effect.

There have recently been two great sacrifices to electric lighting, or rather the newspapers so report; but the electricians will no doubt argue with energy that there has, in these instances, again been a libel on electricity. It would be very strange indeed if all the reports as to fires caused by electricity were ill-founded. The electricians say they are, and no doubt wish they could believe their own assertion. The Italian and Hungarian Decorative Art Sections of the Milan Exhibition have been completely burnt out, and other sections have been seriously damaged—the estimated loss reaching about £160,000. It is believed, the newspapers say, that "the outbreak was due to the fusing of an electric lighting wire;" and there "was no ground for any suspicion of incendiarism." On July 18 there was also a big fire at an extensive drapery establishment in South London, and computed damage to the extent of £30,000 was done. There again, it is reported that something went amiss with the electricity supply; and the "resulting fusing" set fire to quantities of hanging laces and light goods. And one of the inducements held out for using electricity is its safety!

There has been constant illustration of the necessity for a revision of the accounts of municipal electricity departments; and the latest is from Bristol. After all the boasting of Alderman Pearson as to the accounts and finance of his department being above suspicion, the ratepayers have learned that the accounts are so involved that even Mr. H. R. Hooper, the Inspector of the Local Government Board who, perhaps more than any other man, knows how to dissect the accounts of a municipal electricity concern, cannot understand those of Bristol. Alderman Pearson is very sore about it; and he has told his colleagues on the Council that there will be an opportunity of dealing with Mr. Hooper—"that gentleman," the irate Alderman said—later on. The occasion of Mr. Hooper's confession was an inquiry the other day into an application for a loan of £103,554, a large part of which is to be spent in extending the reserve plant in case of need. Practically the whole inquiry was a farce; for Mr. Hooper could not get details nor dates, nor in fact anything of a satisfactory nature. He naturally wants to know what is the good of an inquiry if he cannot get the necessary information; and, as has been the case in several other inquiries, there has had to be an adjournment for the production of the requisite particulars. A little advice was given to the Corporation by Mr. Hooper, as to the advantage of paying for small and temporary matters out of revenue rather than lumping everything on to capital; and he also made known the decision of the Local Government Board not to permit the payment of the wages of permanent men out of loans. The wisdom of this, if the works upon which they are engaged is of the nature of a development chargeable to capital, is not quite clear.

THE NOTIFICATION OF THE GAS REFEREES.

Revised Issue.

THE Notification which the Metropolitan Gas Referees issued on the 1st of January last has for some time been out of print; and a reprint has now been published embodying a few alterations in the prescriptions. Apart from merely verbal changes, the following are the points in which the new issue differs from the earlier one.

The original issue prescribed that after the gas supply to the "Metropolitan Argand Burner No. 2" on the photometer-table had been adjusted to a rate of consumption of 5 cubic feet per hour more or less, the air supply to the burner should be regulated thus: "The damper for regulating the air-supply to the burner shall be screwed upwards until a sensitive point is reached, at which the flame begins to tail-up rapidly above the chimney. It shall then immediately be screwed back half-a-turn as judged by the projecting pointer attached to the damper." The revised issue contains the following instruction in place of that just quoted: "The damper for regulating the air-supply to the burner shall be screwed upwards until the flame is on the point of tailing above the chimney and then immediately be turned down only so far as to ensure that the flame burns without any smoking."

In the section relating to testings with the standard flat-flame burner, it is now prescribed that a new burner shall be used every "week" in place of every "month" as hitherto.

The instructions as to testing the calorific power of the gas have also been slightly altered. The correction to be applied to the result in respect of the difference of temperature between the effluent gas from the calorimeter and the surrounding air is halved in magnitude. The instruction runs: "The difference in degrees centigrade of the temperature of the effluent gas and of the surrounding air shall be taken, and one-sixth [instead of "one-third"] of this difference shall be added to the result previously found if the effluent gas is the warmer of the two, or subtracted if the effluent gas is the cooler of the two." It was formerly stated in a foot-note that "this correction depends upon the proportion of air to gas which the construction of the instrument determines;" while now it is said that "this correction has been found by experiment." Previously the collection of the condensation water could be started not less than ten minutes after the calorimeter had been placed in position; whereas now "twenty" minutes is substituted for the "ten," while the amount collected in not less than "thirty" minutes (in place of "fifteen" minutes formerly) is to be measured.

In the appendix relating to the "Metropolitan Argand Burner No. 2," one correction and two additions have been made to the dimensions marked upon the full-sized drawing of the burner, and the following statement has been added: "While these [the important dimensions] are given in every case to the nearest thousandth of an inch, this degree of accuracy is not essential. The important dimensions are those governing the gas and air passages; but all should be adhered to as nearly as workshop practice allows."

The description of the gas calorimeter in the appendix has been slightly amended. It is now stated that the overflow funnel should be provided with a lid to keep out dust, and that the positions of the inlet and outlet water thermometers should be

interchanged every month. Pieces of flexible tubing are to be attached to the waste-water pipe of the change-over funnel (in order to avoid splashing), and to the condensed water outlet (to guide the water into a flask).

The following instruction has been added in the appendix relating to the reports of results of testings: "In making his returns for the illuminating power as given by the flat flame, and for the calorific power, the gas examiner shall insert in brackets the illuminating power of the gas found in that testing made with the argand which is nearest in point of time to the testing with the flat flame and with the calorimeter respectively."

In the description of the table photometer, two small changes appear. It is now provided that there is to be in the fourth dark screen—*i.e.*, the screen which stands at the side of the table near the "Metropolitan" argand burner—an opening fitted with glass of neutral tint, through which the height of the flame may be observed without fatiguing the eye. Three, instead of two, small mirrors are now employed on the photometer. The new mirror, which is of flat glass, is placed on the top of the screen which stands immediately in front of the observer, and is to be so arranged as to throw light on the photometric scale.

The regulations embodied in the revised Notification are to be in force until superseded by a subsequent Notification.

THE AMERICAN GAS INSTITUTE.

Preliminaries for the First Meeting.

We learn from a recent number of the "American Gaslight Journal" that a meeting of representatives of the Committees appointed by the American Gaslight Association, the Western Gas Association, and the Ohio Gaslight Association to organize the American Gas Institute, and to merge therein the three Associations named, was held in Chicago on the 10th ult. There were present Mr. F. H. Shelton and Mr. W. M'Donald, representing the American Association Committee; Mr. K. M. Mitchell and Mr. Paul Doty, the Western Association Committee; and Mr. John D. M'Ilhenny and Mr. Irvin Butterworth, the Ohio Association Committee. The Joint Committee chose Mr. Shelton as Chairman, and Mr. Butterworth as Secretary.

On taking the chair, Mr. Shelton stated that the object of the meeting was to carry out the instructions given to the Committee by the three co-operating Associations—viz., to do everything necessary and expedient in their judgment for the organization of the Institute on the lines laid down by the plans and constitution adopted by the Associations, and to arrange for the first meeting. Among the matters to be attended to by the Committee at the meeting, the Chairman enumerated the following: (1) The selection of a time and place for the first meeting. (2) The selection of a Presiding Officer and of an Acting Secretary and Treasurer, to serve until that meeting. (3) The appointment of a Committee of Arrangements for the meeting. (4) An arrangement for obtaining official lists of the members, in good standing, of the three participating Associations. (5) The appointment of a Committee on Finances. (6) The appointment of a Committee to design and recommend a permanent badge for members of the Institute. (7) The appointment of a Committee to provide suitable papers to be read at the first meeting.

The meeting then being declared formally opened, Mr. M'Ilhenny presented the following resolution, and moved its adoption: "That by virtue of the powers conferred upon us by our respective Associations—namely, the American Gaslight Association, the Western Gas Association, and the Ohio Gaslight Association—we, the representatives thereof here present, declare that these three Associations do now merge into and form the American Gas Institute; the officers of three participating Associations retaining their respective offices until the merger shall become effective, all present salaries to terminate at the time of the first meeting of the Institute." On a vote being taken, the resolution was declared to be unanimously adopted.

It was next resolved to hold the first meeting of the Institute in Chicago, from the 17th to the 19th of October; and Mr. B. W. Perkins was selected as the Presiding Officer, with Mr. C. F. Prichard as "alternate." Mr. J. W. Dunbar was chosen as Acting Secretary and Treasurer, with Mr. G. G. Ramsdell as "alternate," with a salary of $100 a month and expenses, from July 15 to Nov. 1, 1906, or till his replacement by a successor; and Messrs. Walton Clark, Paul Doty, Irvin Butterworth, and F. H. Shelton (Chairman) were appointed a Committee to secure suitable papers for the first meeting. A Committee of Arrangements and a Finance Committee were also nominated, as well as Committees to undertake details—one being to report to the first meeting of the governing body on the question of dividing the Institute into sections for different classes of work. The Acting-Secretary was instructed to procure, for the first meeting of the Institute, a progress report from Mr. A. E. Forstall, a report on new business methods from Mr. George Williams, and any other departmental and committee reports arranged for at their last annual meetings by the three merging Associations; also to notify to the Editors of the Wrinkle Departments of the merging Associations to proceed with their work of collecting "wrinkles," advertising for them over their joint signatures should they so desire, and submitting their reports to the Institute as one report.

CONCILIATION IN LABOUR DISPUTES.

There were given in last week's "Journal" some figures from the eighteenth annual report on strikes and lock-outs in the United Kingdom, prepared by Mr. A. Wilson Fox, of the Labour Department of the Board of Trade. Attention was then devoted solely to the question of labour disputes themselves; but now we may glance shortly at the part played by conciliation and arbitration in the settlement of disagreements between employers and employed. This is a more pleasant, if no more important, aspect of the labour question than that already dealt with.

Of course, statistics in such a matter as this are apt to be a little misleading if not fully considered, inasmuch as one dispute involving a large number of men may greatly add to the figures in one year as compared with another, without making a corresponding difference in the number of disputes dealt with. For instance, there was in 1905, as compared with the previous year, a considerable decrease in the number of workmen involved in disputes settled by conciliation or arbitration; but it should be noted that the high figure in 1904 for numbers involved was due to the inclusion of the settlement of the general dispute in the South Wales tinplate trade, by which no less than 14,000 workpeople were affected. Thus while there was only a difference of three in the number of strikes and lock-outs settled by arbitration or conciliation in the two years named (28 in 1904, and 25 in 1905), the total number of workpeople affected was nearly three times as great in 1904 as in 1905—the figures being 23,388 and 8692 respectively. Roughly speaking, about 8 per cent. of the disputes occurring in 1905 which involved a stoppage of work, were settled in this manner. The report states that during the past five years there has been greater resort to conciliatory agencies for settling disputes in the mining and quarrying industry than in any other group of trades. Of the 148 disputes, affecting directly 52,795 workpeople, which have been settled during the last five years by conciliation or arbitration, 42 (affecting directly 13,948 workpeople) were in this industry. Building trades come next; and then the metal, engineering, and shipbuilding trades. Of disputes settled by conciliation or arbitration during 1905, sixteen were arranged by conciliation and nine by arbitration. Conciliation and Arbitration Boards dealt with seven stoppages, while sixteen were arranged by individuals.

This brings us to a consideration of the work of permanent Boards of Conciliation and Arbitration. The figures so far given relate to all disputes in which a stoppage of work was involved; but it need hardly be pointed out that the most important function of Conciliation and Arbitration Boards is not the settlement of strikes and lock-outs, but the adjustment of questions which might otherwise culminate in a cessation of work. The total number of cases known to have been considered by 66 permanent Boards in 1905 was 1726, compared with 1418 cases considered by 65 Boards in the previous year. This is a somewhat notable increase. Of the 1726 cases in 1905, 834 were withdrawn, referred back, or settled independently of the Boards; and 53 were still under consideration at the end of the year. This leaves 839 cases which were settled—614 being by the Boards or Committees, and 225 by Arbitrators or Umpires appointed by them. As usual, there was a very great variation in the importance of the cases. The part taken by the Coal Mining Conciliation Boards was a very large one; the mining and quarrying industry accounting for nearly four-fifths of the cases settled during the year. One case considered by the Conciliation Board for the Federated Districts of England and Wales involved the wages of about 230,000 workpeople; while the reductions in wages arranged by the Conciliation Board for the Northumberland coal trade affected 35,000 workpeople. The 463 cases settled by the Durham Joint Committees, on the other hand, affected in most instances very few workpeople. Mr. Fox points out that the Conciliation Boards in the coal trade which control the general level of wages, are quite distinct from the local Joint Committees; the latter being concerned with questions arising at individual pits. The number of Boards which have settled disputes during the past five years, so far as is known to the Labour Department of the Board of Trade, is as follows: 1901, 57; 1902, 60; 1903, 65; 1904, 57; and 1905, 60. During the past year three new Conciliation Boards were formed; while two ceased to exist. It should be remarked that in the engineering and cotton trades there are arrangements between employers and employed for the settlement of disputes by conciliatory means which do not fall quite within the limits of what is ordinarily known as a Conciliation Board. In both industries good work was done last year in the settlement of disputes.

Mr. Fox's statistics show that the part played by the various Boards and other bodies in the adjustment of labour questions is by no means insignificant—a fact on which both masters and men have the most substantial reasons for congratulating themselves.

An Early Record of Gas.—Among the items reproduced in last Sunday's "Observer" from their issue of a century ago (Aug. 10, 1806), was one under the heading of "New Inventions"—viz., "Mr. Head, the chemist, has obtained a patent for certain means of obtaining inflammable gas from pit coal, in such a state that it may be burned without producing any offensive smell."

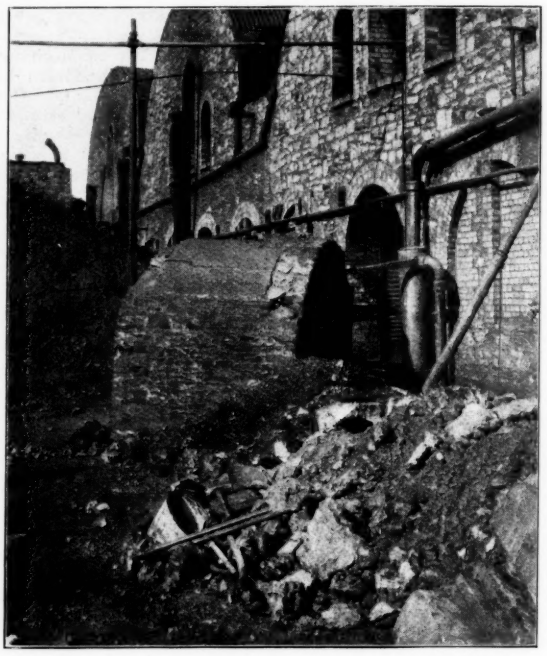
CHANGES AT THE DEVONPORT GAS-WORKS.

SOMETHING has already been said in the "JOURNAL" about the improvements recently effected at the Devonport Corporation Gas-Works. Attention was prominently called to the matter on the occasion of the visit of the Corporation a short time since for the inauguration of the carburetted water-gas plant; and there was further reference to the subject during the discussion on the accounts of the Gas Department at a subsequent meeting of the Town Council.

The alterations carried out have not involved any very great structural works; for the old retort-houses and coal-stores, and some other antiquated buildings, still remain to be dealt with. In time they will, no doubt, give place to structures built on more modern lines; but for the present all it is possible to do with them is to patch and repair such parts as are in danger of falling down. That this is not a remote or improbable contingency is evident from the condition of the roof of the main retort-house. This is so full of holes that more sky than roof is visible when one looks up from the floor; while what remains of the weather-worn corrugated iron sheets, flap about in the wind like pieces of dirty brown paper. Quite apart from the question of economical working—which is another story—this is clearly a condition of things that calls for remedy. If the roof does not fall and hurt someone, it is certainly a very poor protection against the weather; and it is easy to believe those who say that, when it is raining, it is better to be out in the open than have the doubtful benefit of the shelter which the roof affords.

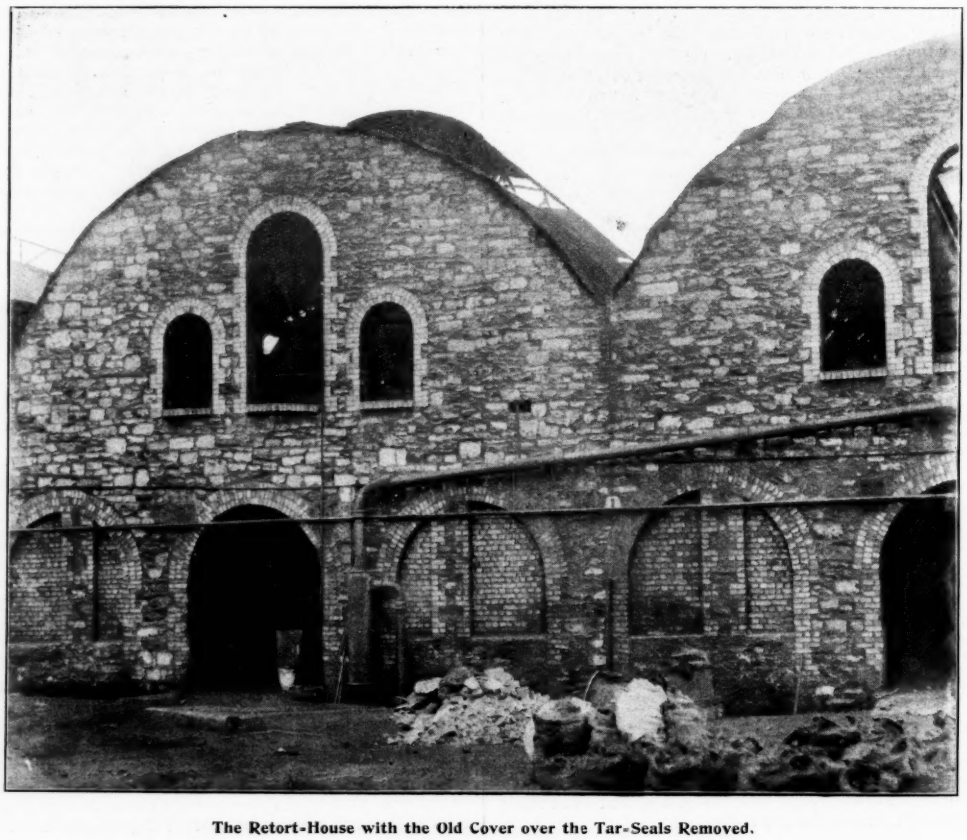
But though these buildings remain, a great deal has been done to improve the general condition of the works. When Mr. J. W. Buckley, the present Engineer, took charge of the works, he had photographs made of some of the antiquities by which he was surrounded; and these pictures are now interesting as illustrations of certain make-shift contrivances and survivals which had accumulated during the long period in which the old Company had been exceedingly sparing in their capital expenditure. The most striking is the curious arch-like structure built over the entrance to the tar-seals. This was placed at the main opening to the retort-house, and was entered by a door which is on the side next the retort-house. Its purpose is not very clear (for the seals are 3 feet or 4 feet below the surface of the ground), while it was certainly not an ornamental structure. As a recent view of the same spot shows, the building has been cleared away, and the tar-seals are now covered with a removable iron plate, flush with the level of the ground, to the manifect improvement of the appearance of this portion of the works and the comfort of the men who pass that way to and from the coke-yard.

In other series of photographs, there are views of the coke-yard and certain buildings in it. Originally, the coke-yard was roofed over with corrugated iron, on iron girders and pillars. Underneath this roof was put up a hydraulic engine-house—a comparitively new building. Separated from it, but under the same corrugated iron roof, was the pump-house; while an adjacent portion was occupied by the tar-tank. The arrangement was exceedingly inconvenient. The three separate buildings occupied

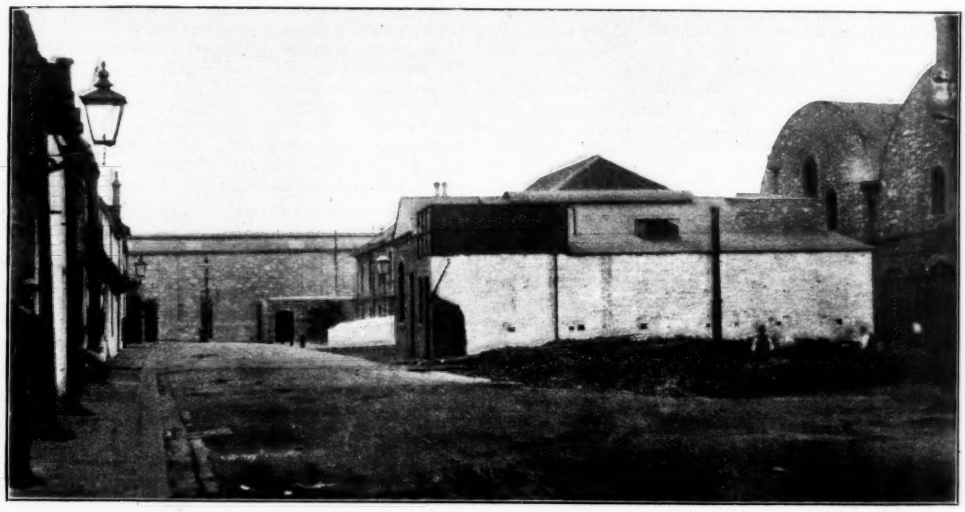


The Old Cover over the Entrance to the Tar-Seals.

valuable space, and their disposition had the effect of dividing the coke-yard into sections, with the result that when there was a large stock of coke on hand, it was stacked all round them, and ran over into the roadway. The roof itself was in a dilapidated and dangerous condition. Part of it was entirely stripped of the covering; and the rest was in a state of decay. The tar-tank was—

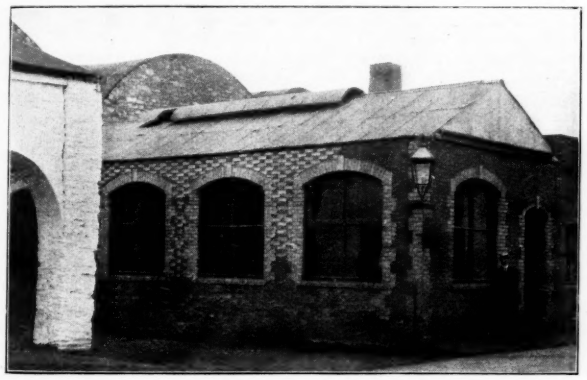


The Retort-House with the Old Cover over the Tar-Seals Removed.



The Tar-Tank and Pump-House as they are.

like the covering of the tar-seals—rather a curiosity. It stood upon a structure of baulks of timber; the space underneath being utilized as a tool-house. Why in the erection of this building timber was used, instead of bricks or stone, there is nothing to show. Possibly, it was done on the ground of cheapness; the timber used being probably part of an old ship. The photographs show not only what this part of the works looked like, but the nature of the alteration which has been effected. The first thing done was to take down the old and really useless roof. Then a new pump-house was erected adjoining the hydraulic engine house,



The Hydraulic Engine-House as it is.

with the whole of the pumps arranged in series. Over the front portion of the pump-house, the tar-tank has been placed. There is thus practically one building instead of three, with the result that the area of the coke-yard is extended, and there is the great advantage of having one piece of ground instead of its being divided by buildings. Although the change is not great, it has added to the efficiency of the works. It has also greatly improved their appearance.

In the same direction, there are other changes which have been carried out. A considerable portion of the yard in the vicinity of the gasholders was formerly in a very rough and uneven condition—with old pipes and other discarded stores lying about in more or less confusion. All this has now been levelled and rolled, and some of it paved. Provision has been made for the stores; while the excavated material has gone to fill up the hollow ground on the new gasholder site. The station-meter has been removed from the old meter-house to a building which was put up a few years ago for an oxide store—an arrangement which is found advantageous for several reasons.

There have also been other changes in the arrangement and disposition of the works; but perhaps enough has been said to show what has been done in the main to bring the old conditions as far as possible up to new requirements.

The Gas Section of the Irish International Exhibition, 1907.—We learn from Mr. Francis T. Cotton, the Secretary and Manager of the Alliance and Dublin Consumers' Gas Company, that applications for space in the Gas Section of the Exhibition have already been received from firms engaged in practically every branch of the gas industry—including manufacturers of gas stoves, meters, conveying machinery, gasholders, retorts, fire goods, incandescent lamps, mantles, fittings, gas-engines, &c.

AN IMPROVED INVERTED BURNER.

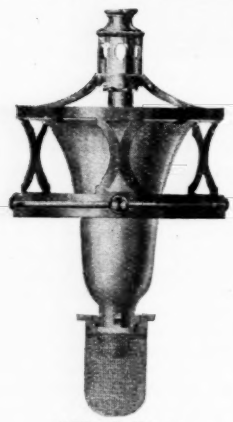
To obtain with the inverted gas-burner the greatest efficiency, there must be precision in all things; and when this is attained, there cannot fail to be satisfaction on the part of the user. One of the most difficult matters that the maker of inverted burners has to deal with is the varying constitution of the gas supply—not only as between town and town, but in those towns where the composition of the gas is varied by the changing proportions of the mixture of coal gas and carburetted water gas, as well as by wide differences of pressure. It ought to be the aim of gas manufacturers to send out a gas as consistent in composition as possible. No matter the quality of a gas in a town, if it is fairly uniform, it is easy to supply nipples for inverted burners that will best suit the quality; but the further difficulty arises that local dealers in fittings do not themselves take any interest in this subject. To them a burner is a burner, answering a certain description, and nothing more; and we are convinced that it would pay gas undertakers to issue to local traders in gas-fittings a little advice as to the sizes of nipples which, for the most popular inverted burners, are best fitted for the local gas supply. The New Inverted Incandescent Gas-Lamp Company, we know, have attempted to keep a record of the nipples applicable to the gas supply of different towns; but there is a difficulty in getting tests made throughout the country, and making the compilation complete—more particularly now that the tendency is from higher to lower qualities of gas. Where such changes are made in quality, gas undertakers ought to offer to supply new nipples to inverted burners, so that the gas consumer is not (through ignorance) detrimentally affected, and the inverted burner is not wrongly judged to have depreciated in its illuminating merit. The point to be borne in mind as a guiding principle is that, no matter how well an inverted burner is constructed, it must be adjusted to the quality of the gas being distributed.

These thoughts occur as the new burner that the New Inverted Incandescent Gas-Lamp Company have introduced, and have commenced to deliver, is examined and placed under trial. It is a burner that does not appear to be affected in its illuminating efficiency with a fairly good margin of variation above and below the points for which it is adjusted both in regard to quality and pressure. Illumination by gas is marvellously cheap now; and, instead of struggling after a candle or two more efficiency per cubic foot of gas consumed, we would rather see makers aiming at improvements to attain still greater constancy by eliminating as much as possible the sensitiveness of the burners to slight variations. From an independent judgment, this appears to us to have been what the New Inverted Company have been primarily striving after in their new burner—the "Nico" No. 4; but in doing this they have also succeeded in producing a higher efficiency. The new burner in outward appearance does not look very different from its precursors. The porcelain cone, which is one of the distinctive features of the Company's burners, is not quite of such perfect shape as in the older form; there being a slight bulging towards the bottom, which will be explained presently. The white cone has a use that was not originally contemplated. It provides ready means of testing the perfection or otherwise of the combustion of the gas; for if there is not perfect combustion, through improper proportions of gas and air, there is considerable discoloration of the cone.

The slight bulging seen towards the bottom of the cone, to which reference is made above, is due to the fact that a specially constructed mixing chamber has been seated at this particular point—that is to say, the mixing chamber is now interposed between the bunsen tube and the mouth of the burner, instead of being situated at the head. In this position, it is found that

almost immediately after lighting up, when the burner has become warm, roaring is prevented even under a fairly considerable range of pressure. In all parts of the burner, the experience of the past has led to scientific refinement of structure and dimensions, so as to ensure the best results. Generally, observation of its operation points not only to completeness of combustion, but to a mantle well covered with flame, to purity and uniformity of incandescence throughout, and to a notable steadiness. It is a brilliant light; and there is an excellent diffusion in all directions.

We have no photometric tests of the new burner at hand yet; but, consuming 3 cubic feet of gas an hour, it may safely be said that a modest computation of the light afforded, even after two or three weeks' use, without any attention after the first adjustment, is 25 candles per cubic foot. Anyone who has been prejudiced against inverted burners, by the experience with the earlier forms will find that, in the new type, great advance has been made; and this is acknowledged by many engineers who have had this latest burner under trial. There is no intention of dropping the sale of the old type of burner, unless the new one has the effect of driving it into disuse. In the matter of cost, however, the new burner will replace the old No. 2; and the price of that burner, which has obtained such wide application, will now be reduced.



"Nico," No. 4.

"Nico," No. 4.
(With Patent Hood.)

Our second illustration shows the new burner with a hood attached, and that hood has several advantages where the situation is suitable. Of course, it gives the burner a little heavier appearance, but not an unsightly one. Its advantages, however, are manifold—the more prominent being the prevention of the discoloration of the fittings, and a cool supply of primary air to the burner. The outlet from the hood is on one side only; and there is a diverting piece at the top. The heated products are thus completely dissipated, and walls and ceilings are protected. It is a neat and useful arrangement, and we can conceive many positions where the hooded burner will be a benefit. The choice of suitable glassware makes a great difference in the appearance of the hooded burner; and speaking of glassware, it is noted that for inverted lamps it has been largely extended in range to accommodate itself to both decoration and employment.

We believe the coming season will produce a big increase in business in inverted gas-burners, for they are eminently to the liking of gas consumers, as the progressive sale in recent lighting seasons has shown.

PERSONAL.

Mr. William Henry Haley, of Bradford, pipe-founder, senior partner in the firm of Messrs. E. & W. H. Haley, left estate valued at £10,129.

Mr. George Dawson, the Managing-Director of the Thorncliffe Iron-Works (Messrs. Newton, Chambers, and Co.), near Sheffield, was last week the recipient of his portrait painted in oils. The presentation was subscribed for by present and past members of the Wortley Board of Guardians and the Wortley Rural District Council as an appreciation of the long and valuable services which Mr. Dawson had rendered in administering the affairs of one of the largest rural authorities in the kingdom. Mr. Dawson, who is 75 years of age, has been a Guardian and District Councillor ever since 1872, and is at present Chairman of both bodies.

An interesting event took place a few days ago at the works of Messrs. George Waller and Son, at Stroud, when Mr. George Waller was congratulated on the attainment of his sixtieth year in the business with which his name is associated; the good wishes offered being accompanied by a tangible memento of the occasion in the shape of a solid silver salver, bearing the following inscription: "In commemoration of Mr. George Waller's 60th year in the Engineering Trade." The testimonial was subscribed to by everybody in the firm's employ, and it was presented in quite a simple way just before closing time—Mr. and Mrs. G. Waller, together with their son (Mr. B. B. Waller), being asked to go into the works on an important matter. When the presentation was made, it came as a great surprise to Mr. Waller, who gratefully acknowledged it in a few kind and pleasant words. He was, however, too much affected by the expression of good feeling displayed towards him to make many remarks. He nevertheless assured the donors that he would treasure their gift as long as he lived, and would hand it over to his son as an heirloom. An interesting point in connection with the presentation was the fact that the spokesman on the occasion was an employee who has been in the service of the firm for 43 years.

Mr. Charles Hunt, who is a Director of the Monte Video Gas Company, Limited, and has an interest in the Gas Companies of Buenos Ayres, is now on his way out to South America (accompanied by one of his daughters), and will be absent from home for a few weeks. The visit was projected for last year; but the serious illness of Mr. Hunt upset the plans. We are glad to hear from Madeira that Mr. Hunt is enjoying good health, and the pleasures of the voyage. It will be the hope of all his numerous friends that the voyage, rest, and change, will have very beneficial effects, so that he may return to his professional and presidential duties in the best of health and full of vigour.

OBITUARY.

The death occurred last Friday, at the age of 85, of Mr. Samuel Tagg, who held the position of Superintendent of the Radford Gas-Works of the Nottingham Corporation for a period of more than fifty years.

Mr. James Campbell, of the firm of Messrs. J. & J. Campbell, writers, Saltcoats, and Town Clerk of the burgh, died suddenly while attending, as Clerk, a meeting of the Irvine and District Water Board at Kilwinning on the evening of Wednesday last. Mr. Campbell held many local offices, among which were those of Secretary and Treasurer for the Gas Companies of Stevenston and Saltcoats.

The death is announced of Herr Ernst Grahn, of Hanover, who is probably best known in this country as the compiler of the monumental volumes of statistics relating to the water supply of towns in Germany and some adjoining countries. Formerly, he was Manager of the gas and water works at the steel works of the firm of Fr. Krupp, at Essen, but had for many years been in practice as a consulting civil engineer. He had taken a very active part in the development and organization of the German Association of Gas and Water Engineers. The celebration of his seventieth birthday a short time since was made the occasion of fitting recognitions on the part of his colleagues of his services to the water industry at large. He died at Waldhausen, near Hanover, on the 25th ult.

The New Argentine Company.

In the "Journal" for the 3rd ult. (p. 14), we noticed the formation of the Bahia-Blanca Gas-Works (Construction) Syndicate, Limited, with a capital of £70,000, to construct all kinds of works connected with the supply of gas, electricity, or water in the Argentine Republic; to manufacture and supply gas for public and private purposes at Bahia-Blanca; and to adopt an agreement with the Buenos Ayres (New) Gas Company, Limited, and Messrs. J. C. im Thurn and Sons. Mr. Arthur Gibson has been appointed Engineer to the Syndicate; and it was arranged that he should sail from Southampton for Buenos Ayres last Friday, in the Royal Mail steamship *Danube*. After staying a few days in Buenos Ayres, he will proceed to Bahia-Blanca to put in hand the building contracts, main-laying, &c. The contracts for the retorts, machinery, ironwork, &c., have been placed in England. Mr. Gibson has had considerable experience in building gas-works in the Argentine Republic, and his knowledge of the customs of the country, language, &c., should prove of great utility to him in his new enterprise. The original plans and surveys for these works, which were laid before the Municipality, and are designed to produce 60 million cubic feet of gas per annum, were prepared by Mr. James Dougall, the Engineer of the Buenos Ayres (New) Gas Company.

At the Parish Church, Horsham, last Thursday, the marriage was celebrated of Mr. Reginald G. Clarry, son of Mr. George Clarry, the Secretary of the Cardiff Gas Company, and Miss Laura Marian Sapey, the eldest daughter of Mr. E. D. Sapey, the Manager and Secretary of the Horsham Gas Company, Limited. At the conclusion of the ceremony there was a reception at the Corn Exchange, which was prettily decorated; and subsequently Mr. and Mrs. Clarry left for Llandaff on the honeymoon, which is to be spent in North Devon and Cornwall. Among the numerous presents were an inlaid porcelain tea-tray from Mr. and Mrs. J. N. Reeson, of Beckton (Mr. Clarry being one of the engineers under Mr. Reeson), and an ornamental glass flower centre from the workmen of the Horsham Gas Company. Mrs. Clarry, who is a talented pianist, has for some time been honorary accompanist to the Horsham Musical Society; and the members testified their appreciation of her services and their personal regard by presenting her and her husband with an engraved salver, with inscription, and a silver-mounted claret-jug.

IRISH ASSOCIATION OF GAS MANAGERS.

PRESIDENTIAL ADDRESS

FOR THE

ANNUAL GENERAL MEETING AT DUBLIN,

On AUGUST 14, 1906.

By R. Bruce Anderson, Assoc.M.Inst.C.E.

Gentlemen,—Briefly, but sincerely, I thank you and assure you that I appreciate the honour you have done me in electing me your President. Any shortcomings there may be in the way I carry out my duties, I must ask you to charitably condone, and attribute them to my inexperience through lack of serving an apprenticeship on the Committee.

During the year, we have to deplore the death of one of our members, Mr. Williamson, of Clones—a prominent figure—one of those who helped form the original Association and who will be much missed from our gatherings. Also during the year the hand of Death was laid heavily on the helpmeet of our esteemed Vice-President.

Counting the roll of members, as given in the last volume of our proceedings, I see it totalled precisely 100; but of these there are only six who are original members. Looking through the lists of intervening years one regrets missing familiar names of men who have seceded from one cause or another—several having advanced to more responsible positions across the Channel. These secessions from our ranks are to be regretted, and I hope present members will be animated by a more loyal spirit, and should they leave the country, will nevertheless remain members of what to some must be, so to speak, their "Alma Mater." Though we do not all have the good fortune to be Irishmen, we cannot fail to have contracted some of their traits, of which hospitality is a chief one, and old friends from the other side would always be sure of a hearty welcome if they revisited the old country, and retention of membership of the Irish Association should be as a magnet drawing them back. Members leaving the old country might be transferred to a separate class, with a nominal subscription—merely to keep them in touch; and to minimize such secessions, I would suggest the institution of life membership by compounding for future subscriptions.

During the year, I have thought frequently upon what subject I should enlarge upon in my address to you; and when an idea struck me I, following Captain Cuttle's advice, made a note of it. Consequently, when I took pen I suffered from an *embarras de richesses*. I found several headings so put down, each of which could form the text for an address by itself. Being indisposed to discard wholesale, and time lacking to enlarge upon all, I purpose touching briefly on several.

Technical Education.

In his address at Cork, Mr. Langlands gave some sound advice on this subject. Four years are passed since then, and great opportunities have meanwhile been put in our way by the equipment of technical schools throughout the country. When I say "put in our way," I mean not only for our own personal benefit but for the benefit of those under us.

Moving about in the South, I come frequently in contact with Inspectors and others connected with these technical classes, and from conversations with them am forced to the conclusion that up to the present the movement has not been a success—certainly not the success it should have been. Let us not despair, however. I would urge you all to do your little part in stimulating the movement in a right way. We have it in our power to do so.

The conducting of a gas-works is an occupation necessitating considerable technical knowledge. We are all consequently exceptionally alive to the benefits these classes should confer. We can all do with more physical and chemical knowledge than we have got; and, however fortunate we may have been in our school or college education, joining these classes would do none of us any harm. The mere revisal of learning much forgotten, would be advantageous; but while so benefiting ourselves by becoming students, I would urge we should join from an altruistic motive, sacrificing ourselves for the benefit of others. Our joining will have a wonderful effect as an example to others in our towns. Our fitters and apprentices, and a few personal friends, would form the nucleus of a class in any subject we might wish to take up; and I am confident that, by setting a good example in this way, we have a grand opportunity of doing great good to those around us. It requires some courage for men of our years to apparently humble ourselves by going back to school; but do it and it won't be regretted. Great praise is due to one of our Past-Presidents, Mr. Tooms, who carried through the experiment at Waterford, where one of the Inspectors informed me the technical classes in those subjects we are interested in promise best of any town in the South—due to the energy which that one individual threw into the scheme.

Having got our men to go to classes, we all have opportunities to encourage them by providing chemical and physical apparatus for use on our works. Analysis of flue gases by the Orsat apparatus is always profitable, as also the testing of purifiers by the Harcourt apparatus. If we accustom our men to use these instruments, we make our men much more useful, as they begin to think, which they likely never did before.

One of the managers with whom it is my pleasure to be associated, demurred at spending some ten guineas or so on flue-gas testing apparatus, because his operations were on so small a scale. The expenditure was nevertheless made, and not regretted by either him or his employers.

Apprentices.

Are we doing our best for the lads under us; and do we get the proper sort of lads? Technical classes are not going to turn out full-blown journeymen. The apprenticeship system will still remain. A cause of frequently expressed dissatisfaction in this country is the importation of Englishmen and Scotchmen to fill positions as skilled workmen. There is no use yielding in this matter by employing men who have not had the opportunities of getting a proper training, but we can set about training them now. In Ireland the social grades differ very much from those across the water; and the class from which we draw apprentices here can ill-afford to keep a lad for several years receiving only a nominal salary while learning his trade. The consequence is that many lads come into our hands, starting at a few shillings a week, to leave us as soon as they can earn an extra shilling or two elsewhere; and so they gradually advance fairly quickly to 18s. a week or so, and there they stop. This is cruel, and is not as it should be. I favour having lads formally indentured as apprentices. The scale of pay must be set higher than is usual; but after three years the lad will be worth considerably more than he will be drawing, and so will recoup what he over-cost in his first three years, as also what may have been lost through any whose indentures had to be cancelled. In the works with which I am connected, we have several apprentices bound for a five years time. We take them on, on trial, first for six months, to judge if they will likely suit us, and whether the vocation is likely to suit them. Both sides being so satisfied, formal indentures are executed; the lad drawing the following rates of pay: 14d. per day first year; 18d., second year; 22d., third year; 26d., fourth year; 30d., last year. On leaving, his indentures are handed to him fittingly endorsed; and while with us he has every opportunity of qualifying for the post of gas-works foreman, which should be the stepping-stone to a managership.

All these apprentices have not turned out a success; but some have. We have not always picked from the proper class. But we learn by experience; and the success we have had warrants us continuing the system.

In one of the towns with which I am associated, we have arranged with the Principal of a School there to each year find an opening for one of his head boys who may have shown an aptitude for technical work. On interviewing him on the matter, I found him much pleased with the idea; and we meditate extending it to other towns.

I would urge you all to do something similar, and let us put an end to that rearing of "half-inch" men, as has been so much done in the past. The day of the handyman—ready for anything but good at nothing—has not passed, and we must aim at steadier application towards a given goal.

Sick Clubs.

This is another subject concerning the welfare of those under us to which I would draw your attention. We are all associated with small undertakings, and really in not any of our works do we have sufficient members to form a substantial Society. By association of neighbouring works, the numbers might be augmented; but even then they would fall short of what would be needed to form a Club which could stand the strain of an epidemic. Furthermore the framing of rules and regulations is a matter abounding in pitfalls, and requiring great experience, which is not as a rule at our disposal. The result is that gas employees generally in this country are in no club at all. If they fall ill, they depend upon the charity of their fellows, and the generosity of their employers. This dependent position saps the self-respect of men, and we should try and raise them from it.

We can urge them to join the large Societies—Hearts of Oak, Odd Fellows, &c. But though we may urge we cannot do more; and our men would not show much alacrity in joining Societies of which they would always feel they were more or less outsiders. We believe to have solved the difficulty in some works with which I am connected, by forming local branches of a very large Society called the National Deposit Friendly Society. Our first branch was formed four years ago; and as I judge we have succeeded, I propose to describe at length the *modus operandi*.

The motto of the Society is "Help for Those who Help Themselves;" and this is borne in mind throughout its well-thought-out rules and regulations. To begin with, it is a large Society, spread all over the country; and the great advantage of that is that, in case of a local epidemic of typhoid or any other such complaint, the heavy draw of sick pay, which would promptly bankrupt a local Society, is drawn from the general funds of the whole Society. Concomitantly you have all the advantages of a small local Society, the *esprit de corps*, the holding of offices, and such matters, which men delight in.

To form a local branch, it is only necessary to get seven members. A Local Committee is chosen, a Chairman and a Secretary are appointed, and subject to keeping to the stereotyped rules and regulations, the management of the branch is in their hands.

All who have had any experience of sick clubs, know what this means. The excitement of elections, the having a position to fill, and having something to do, appeals to the men in the better part of their natures.

Contributing to the funds entitles members to various benefits in way of old age pay, funeral expenses, grants on wife's confinements, &c. But the most prominent feature is the payment of sick pay on a scale of 1s. per day for 1s. per month contributed—*i.e.*, of course, in respect of a normal hand. Unhealthy and aged hands fall into less favourable classes.

After joining, a man has to wait some months before he becomes entitled to benefit. This period can be abridged by contributing temporarily on a higher scale.

The contributions are allocated under two different headings. A portion goes into the general coffers of the Society; and the rest may be put to the member's individual credit—in what is really a savings bank, called his deposit account. A member is in benefit as soon as he has contributed to the general funds the amount of six monthly contributions, and has in his deposit a sum equal thereto. The portion which goes into the general coffers is subject to deduction for various funds—old age pay, for instance—and bears also the drain of sick pay demands. The surplus each year is divided proportionately among the members, and credited to their deposit accounts.

Should a man fall sick, he gets his doctor's certificate and goes on sick pay, which in case of a normal hand is paid to him half out of the Society's funds, and the rest from his deposit account. In case of prolonged illness, this payment lasts as long as the deposit account holds out, when the sick pay is continued for a further similar period at a reduced rate.

It will be seen from this what an inducement men have to be thrifty. Savings may be banked to augment the deposit account while in health, and form a lucrative insurance in case of sickness. In addition to this, savings bank rate of interest is added to the deposit account each year.

We have found with our men that an attack of illness has a wonderful effect in making them thrifty when they recover. On first joining, there are sundry expenses to be met for medical examinations, &c., amounting to 2s. or 3s. per head.

Where we have formed branches, we have adopted the following basis of assisting the men. I will describe the case of a normal 2s. member. I must premise, though, that formerly we were in the habit of granting half-pay to men off sick. Now where we have started branches we give no sick pay; but we assist the men in their contributions on a simple scale which happens to cost the companies approximately what they used formerly to pay direct to the men. On first joining, the Company defrays the preliminary expenses, and pays into deposit 2s. per month for each man, while he contributes 2s. per month to the general fund. This gets him into benefit in six months' time. Then no more is paid into deposit, but the man drops his contribution to 1s. per month and the Company also contribute 1s., so maintaining the total contribution to the general fund to 2s., which entitles the man to 2s. per day sick pay in case of illness. Men may join for larger amounts than 2s.; and if so the company assists them *pari passu*, but draws the line at a limit of 3s.

In the case of aged or unhealthy lives, the Company contributes on a higher scale, so as to lessen the burden upon the individual.

In the case of very small works, we affiliate them to the nearest branch, and let them join it; but the numbers necessary are so few that even a small gas-works can easily form a branch—their own men providing the nucleus, and the balance being recruited from outsiders.

We find that our branches work well; and I commend the Society to those of you who have not yet done anything in this direction. I may add that full particulars may be had from the Society's Secretary, whose address is: National Deposit Friendly Society, No. 11, Red Lion Square, London, W.C.

So much for matters pertaining to the welfare of those under you. I now turn to a few other topics of a different nature which I trust may interest you.

Population and Valuation.

I have been chagrined for some years to find that companies with which I am connected did not sell gas so cheaply as other towns of similar population. On looking into the matter, I found it was very much a question of North and South. We all know that in the North there are more industries than in the South, and generally the people are of a somewhat different temperament; but it was difficult to make any definite comparison. While attending a meeting of an Urban District Council lately in connection with a proposed Provisional Order, I was struck with the great differences in the rateable valuations of different towns of similar populations which one of the members quoted. So I obtained the blue-book containing the information, and the following figures may be of use to you. I take four towns in the South with which I have now been connected for many years—Waterford, Kilkenny, Tipperary, and Fermoy—and compare them with the four towns in the North approaching them most nearly in population—Londonderry, Ballymena, Coleraine, and Strabane—and I find that the rateable valuation in the southern towns is £1 8s. per head, as against £2 8s. in the four northern ones.

I don't want to trouble you with a lot of figures; but I have appended herewith a table which all of you will be able to refer to at leisure.

Rateable Value Per Head of the Population.

A.—Towns North of Dublin and Galway.

Urban Districts.

Armagh	2·7	Cookstown	2·2	Longford	1·9
Athlone	1·8	Cootehill	2·4	Lurgan	2·3
Ballina	1·9	Drogheda	1·9	Monaghan	2·4
Ballinasloe	1·9	Dromore	2·3	Navan	1·8
Ballymena	2·9	Dublin	3·1	Newry	2·9
Ballymoney	2·6	Dundalk	2·4	Newtownards	1·5
Banbridge	2·7	Dungannon	2·8	Omagh	2·7
Bangor	5·3	Enniskillen	2·6	Portadown	2·6
Belfast	3·6	Holywood	3·6	Portrush	5·8
Carrickfergus	1·9	Keady	1·7	Sligo	2·0
Carrickmacross	1·7	Kells	1·7	Strabane	2·8
Castlebar	1·3	Larne	2·9	Trim	1·3
Castleblaney	2·6	Letterkenny	1·8	Warrenpoint	5·4
Cavan	2·3	Limavady	2·8	Westport	1·7
Clones	2·6	Lisburn	2·7		
Coleraine	2·9	Londonderry	2·7		

Towns not Urban Districts.

Antrim	2·4	Ballyshannon	1·8	Mullingar	1·9
Ardee	2·2	Donaghadee	3·6	Roscommon	1·7
Ballybay	2·3	Downpatrick	2·9	Tuum	1·4

B.—Towns South of Dublin and Galway.

Urban Districts.

Athy	1·6	Galway	2·1	Queenstown	2·9
Birr	2·1	Kilkenny	1·7	Skibbereen	1·9
Carlow	1·8	Killarney	1·6	Thurles	1·5
Carrick-on-Suir	1·6	Kilrush	1·2	Tipperary	1·6
Cashel	1·3	Kinsale	1·3	Tralee	1·5
Clonmel	1·9	Limerick	1·8	Tullamore	1·6
Cork	2·4	Mallow	2·5	Waterford	1·8
Dungarvan	1·7	Midleton	1·9	Wexford	1·6
Ennis	1·5	Naas	2·4	Wicklow	2·1
Enniscorthy	1·5	Nenagh	1·9	Youghal	2·2
Fermoy	1·7	New Ross	1·4		

Towns not Urban Districts.

Bagnalstown	2·0	Lismore	1·6	Newbridge	1·7
Bandon	2·8	Maryborough	1·5	Rathkeale	2·3
Gorey	1·6	Mountmellick	1·7		

I am connected with two towns in the South, where the rateable value is exceptionally high for the South—viz., Queenstown at £2 9s. per head and Youghal at £2 2s.; and bearing out the inference I draw, gas is comparatively cheap in both these places. There are only ten towns in the South where the valuation exceeds £2 per head, and only one exceeding £2 5s.; whereas in the North there are twenty-five towns exceeding £2 5s., and plenty much richer than that—for instance, Bangor, £5 3s.; Warrenpoint, £5 4s.; Holywood, £3 6s.; Newry, £2 9s.; and several others ranging about that figure.

Now this enormous difference in the wealth of the community means a great deal of difference to a gas company, and indicates that population is an indifferent guide to the importance of a town from the gas manager's standpoint.

Curiously enough, at Wexford (that thorn in the side to every southern gas manager), where gas is comparatively speaking the cheapest in the country, the valuation per head is exceptionally low, being only £1 6s.; but then Wexford is—well Wexford.

Low-Grade Gas.

After insisting upon keeping up the illuminating power for many decades, we are at length learning that low-grade gases are what our consumers want at a reduced price. Although quite conscious that 90 or more per cent. of consumers' complaints of bad gas are due to lack of pressure, nevertheless having the words "bad gas" continually dinned into his ears, the average gas manager has attributed much more importance to his illuminating power than it was worth to his employer or customers. Should any of you still be habitually using cannel or other methods of enrichment, I would advise you to try the experiment of sending out unenriched gas at 50 per cent. more pressure; and I venture to say you will have fewer complaints of bad gas. Complaints of high gas bills will come in when accounts are rendered for the first time after the change; but the public quickly learns to control excessive pressure, and is very much better satisfied with the good light obtainable when there is plenty of pressure even at an enhanced cost, than with a supply of gas however rich if its pressure be low. The average gas director also is hopelessly at sea with respect to illuminating power, and is far too prone to blame the quality of the gas than think for a moment that some local obstruction has interfered with pressure.

Our esteemed friend and frequent visitor, Mr. Shadbolt, raised a hornet's nest about his head recently by relating what he was doing at Grantham by drawing producer gas into his hydraulic main. The most forcible, though I think foundationless, argument used against him was that he did not give the consumer an abatement of price directly proportional to the reduced calorific or illuminating value of the gas. Considering how much more gas people waste than use, I have no doubt the Grantham consumers

were very much better off with the low-grade gas than with the high grade, even though they did not get the reduction in price which would result from working out a rule-of-three sum. They would save money on all the gas they burnt, whereas they would lose only on the gas they used.

Has it ever occurred to you to analyze a consumer's account, to see how much gas he uses and how much he wastes? Or to put it in other words, Have you reckoned how much less gas a consumer might use while nevertheless having all the light he requires? Consider how different people's habits are who use gas and electricity. Make an evening call on a friend who uses gas. You find a gas-burner full on in the hall. You are shown into a room where a gas jet is already alight, where your friend joins you. Call on a friend using electricity, and your knock at the door is shortly followed by the switching on of a light in the hall as the servant comes to open the door. You are ushered into a room quite dark till after the door is opened. The price of electricity compels most users to resort to these economies, so as to keep their bills at all within reason; but they don't like it. The average individual dislikes trouble. He much prefers to have a light already in the hall, on the landing, in the bathroom, in the bedroom, rather than find it necessary to grope his way about in semi-darkness.

How many people adjust their lights to their reqirements? The great majority are quite pleased as long as there is not too little. One burner in a room is not quite enough; so two are used, of the same size as the one which alone nearly sufficed. A light is wanted for convenience of reading at the fireside. Up goes another "C" burner, where a "Gem" or a "No. 0" Kern would have been ample. But the burners in the room would not have then matched, which is much more important than the extra gas used.

Shop window lighting, how is it done? Does the shopkeeper experiment, or calculate how much candle power will show off his goods? Not at all. A certain number of burners will suit the structural arrangements—numbers of panes of glass or whatever it may be. The question of symmetry has to be considered and many others; but the very last of them is the quantity of light necessary.

In all directions you will find a great deal more gas is consumed than need be; and I don't think I would be far wrong in saying that less than one-third of the gas that is burnt is used for the purpose of actually seeing what is illuminated. People like to have plenty of lights about, whether they are using them or not; and a small reduction of price on the whole quantity of gas they burn fully compensates them for the light they lose in consequence of a proportionately greater drop in illuminating power. The cheaper gas is what appeals to them, and they prefer to have cheap gas which they can waste, rather than have a superior gas which they must switch off to economize. Parsimonious lighting is attended with considerable dangers. Only a few months ago a well-known man, Mr. Chubb, was killed by falling down an unlighted staircase at the Foreign Office in London.

The London and many other gas companies are gradually reducing their illuminating power; and the question of the amount of reduction of price to be allowed to the consumer blocks the way of others following suit.

Considering the enormous increase in the quantity of light now given to the consumer by the gas company since the advent of the incandescent burner, I think there is a lot of cant talked on the subject of justice to the consumer. I intentionally use the words "given to the consumer by the gas company," because the consumer would not avail himself of the Welsbach light until the gas companies almost forced it upon him, and actually opened maintenance departments to keep the lights in order when once installed. What was the condition of incandescent lighting before the maintenance system was introduced? A few gas consumers adopted it; and broken mantles and dirty chimneys, dirty burners and poor lights, were generally in evidence. Now since maintenance is taken up, there is a wonderful improvement. Thus I insist that the consumers have to thank the gas companies for greatly increasing the quantity of light they now receive for the same money; and all the rubbish spoken and written about justice to consumers in this matter of reduction in illuminating power, is hypocritical special pleading. The guiding bargains struck between consumers and companies were made long before the days of incandescent lighting; and subsequent ones have merely followed on stereotyped lines, as fresh Acts or Orders have been passed. Considering the great set-back in consumption, or rate of increase, which every Company has had to deplore during past few years from the spread in the use of incandescent burners, gas companies would have been justified in obtaining some relief from their obligations; and it might well take the form of an abatement of illuminating power, even though no reduction in price were made.

In one or two towns with which I am connected, where we are under no restrictions as to illuminating power, we are experimenting with "stretched" gas; and our observations so far indicate that large percentages of producer gas may be introduced without materially changing the illuminating value of the gas. The volume of producer gas introduced cannot very well be metered, so we calculate the percentage by analyzing the gases for any one constituent. For instance, knowing how much carbonic oxide is in the coal gas, how much in the producer, and how much in the mixture, it is a mere arithmetical calculation to arrive at the proportions forming the mixture.

Capital Embarked.

Examining the statistics of Irish gas undertakings, one is impressed with the very low figures representing capital embarked. In the interesting address that Mr. Percy Griffith gave to our Association, six years ago in Sligo, he in part explained how this occurs, by drawing attention to the prevailing habit of utilizing surplus profits for making extensions. He commented upon the substantial character of the buildings generally found in our works, and to the quantity of land available for extensions, which taken in conjunction with the smallness of our works, and that ironwork had to be imported from a distance, and erected by men brought a long way, should lead one to expect the capital per million in Irish works to exceed that in English. Such, however, is far from being the case. In England, the capital embarked in statutory gas undertakings averages out at £860 per million for companies and £590 for local authorities, as against corresponding figures for Ireland of £660 for companies and £340 for local authorities. I am, of course, not deducting repaid loans.

Examining the figures given by the "Gas-Works Directory," one finds numerous instances of Irish gas companies with issued capitals standing at from £250 to £400 per million; many more between £400 to £700; and really very few over £800, whereas that figure is in my opinion a reasonable one at which they ought to average out. If you turn to local authority gas undertakings, you find them now with very low capitals—Limerick with none at all, Belfast under £200 per million, and several others necessitating only a very few pence per thousand to satisfy the claims of financiers.

Now the gas-works in Ireland were never constructed for the amount at which they are represented; and the explanation is a series of unhappy vicissitudes through which the companies have gone—relieved here and there by instances of uncommon philanthropy in some cases and by unscrupulous fleecing in others. Investigating the title-deeds of many Irish works discloses checked careers. Generally they start with a joint-stock company, then lesseeship, private ownership, incorporation under the Companies Acts, liquidation; again private ownership and reincorporation under the Companies Acts, with the result that their present accounts often show the value of the works at the sum which they fetched at forced sale by auction. In other cases you find the investment of surplus profits carried to a great extent—even going the length of passing dividends altogether, in order to enable a much needed holder to be erected. In one case, if I correctly understood the resident manager, a local landowner equipped and ran a gas-works which he subsequently presented as a free gift to the town. Let us hope it was philanthropy and not to get rid of a "White Elephant."

I was informed quite recently of a case where a gas company, finding its works not paying, has offered them free to the local council. In two cases, the local authorities succeeded in frightening the local companies into selling their works for much below their value, whereas the companies if they had been properly advised would certainly have got much better terms by going to Parliament.

The wide variations in capital to be remunerated explains many differences in the prices charged for gas. A company with a reasonable capital of £800 per million, dividing a reasonable average dividend of 6 per cent. needs rather over 1s. profit per 1000 cubic feet; and any gas company which does not obtain and pay that is either badly managed or being carried on more or less as an eleemosynary institution.

In the case of municipally owned undertakings, it is different. There the loans are gradually repaid, and ultimately wiped out altogether—as at Limerick, where no profit is required at all to remunerate capital, so that for that reason alone Limerick gas should be about 1s. cheaper than could be sold by a company similarly circumstanced in other respects.

Statutory Powers.

Another point one cannot help noticing in Irish practice is how very few gas-works are carried on with statutory powers. In commenting upon a law-case concerning the Fermoy Gas Company some months ago, one of the Dublin papers referred to it as being one of the few gas companies in the country which had not put itself under statutory obligations. In the whole of Ireland there are only eleven companies which have done this!

Why is this? There are two reasons. The combativeness of the Irish character and the cost, which latter is necessarily greatly augmented by the former. Statutory powers, which carry statutory obligations with them, are obtainable in two ways. The old way was by Act of Parliament, which is still followed by important undertakings, and which is also to be preferred by small ones where there is opposition. The new way, introduced in 1870, is by Provisional Order. This latter is comparatively inexpensive if an agreement can be arrived at between the gas company and the town. Obtaining powers by Provisional Order is practically a dead-letter in Ireland. Only two companies—Sligo and Wexford—work under Orders. On the other hand, 17 Special Acts of Parliament have been passed for the ten companies working under statutory powers. Sligo has both an Act and an Order.

Thus there are eight Acts for each Order in Ireland; in England, for eight Acts there are more than three Orders; and in Scotland (where reason comes into play more than in either England or Ireland) there are more Orders than Acts.

The cheaper mode of procedure is not followed in Ireland solely on account of the impossibility of coming to an agreement with the local authorities; and the much more expensive mode of promoting a Bill is forced on the companies.

Some years ago Dungannon applied for an Order, which the Board of Trade granted; but when the Board of Trade promoted its own Bill for the confirmation of its Orders, the Dungannon one was deleted at the instance of the local authority.

Tipperary applied for an Order a few years ago, on terms which would have afforded a great reduction of price to the consumers; but the local council wanted a price at which it was not worth the Company's while to do business, and so the application fell through, and the price of gas has continued much higher than the rate offered.

Wexford applied for an Order the same time as Tipperary. Now if there be one place in Ireland where the Gas Company should be on good terms with its customers, it is Wexford, where gas is so absurdly cheap. The Wexford Company was nevertheless vehemently opposed; a local inquiry was held; and rather than lose its Order the Wexford Company agreed to terms which I fear will make it exceedingly difficult to raise any of the small amount of additional capital allowed to it. Investors will hardly run after a stock which will not pay them more than 5 per cent., unless gas be sold for less than 2s. 10d., and on which the dividend will be cut down to less than 5 per cent., if force of circumstances necessitates the price being raised above 3s. 4d., which means that unless Wexford sells gas at less than Cork or Dublin, its new capital cannot earn 5 per cent.

The Fermoy Company has been subjected to much trouble by the Local Authority over the usual matter of opening roads. The Company offered to sell its undertaking to the Local Authority, and leave the price to be fixed by arbitration, which would have been fair to both sides. The Local Authority would not buy on these terms, and declined to consent to an Order being obtained on terms which would mean a big reduction in price of gas, and make it cheaper than in any other town about the same size in Ireland. The consequence will be that a lot of money will ultimately have to be spent in obtaining an Act, which expenditure will prevent gas being sold so cheaply as if an Order were to be cheaply obtained.

At Carrick-on-Suir, a similar story may be told. A portion of the Council considers the price of gas is too high. The Gas Company here has offered to sell by arbitration, or to reduce the price to lower than gas is sold at in any other town of the same size in Ireland—conditional on consent being given for an Order. But the Council will not agree.

This standing out for unremunerative terms is not at all in the interests of the consumers, who could get gas cheaper (to the extent of quite 6d. per 1000 feet) from a statutory than from a non-statutory company, provided, of course, that undue parliamentary expenditure may not have been forced on the latter.

Prices of Gas.

With respect to prices of gas, I have one or two suggestions to make. Differential prices are very common now; and in the published returns of gas companies, it is difficult to draw any conclusion as to what any company is actually receiving. In sending in returns, I prefer to give the average price actually received. The most absurd case I have met with of the ordinary mode of making returns, was that of a company credited with selling gas at over 7s. for lighting and 3s. 9d. for engines. On inquiry, I found the credit of selling so cheaply was due to supplying one small engine to a consumer next door to the works through a special service from the inlet of the governor. Mere prices, without indicating how much is used at each price, are of very little use.

Another suggestion I have to make is with respect to the mode of expressing the price of gas. We express it now in two ways, and are wasting a lot of our brain-power making mental calculations from one to the other. Gas through ordinary meters is priced at so much per 1000 feet, whereas through slots we price it at so many feet per penny. Why not adopt the latter mode for all the gas we sell? It has a lot to recommend it. You will reckon much more quickly for a slot consumer what the using of a certain boiler, fire, or burner is going to cost him, than you will for an ordinary consumer. So many feet per penny conveys a much clearer conception than so many shillings per thousand. It would seem a little strange at first, but we should quickly become accustomed to and, I think, prefer it. The proposed new mode of expression would lend itself very well to making variations in price.

Illumination.

The lack of proper application of physical knowledge in the usual mode of arranging lights, warrants me in dwelling for a few moments on the principles of vision. There are two experiments I would recommend every gas manager to make and study. For the first, the apparatus required is a candle, a bye-pass incandescent burner, and a time table. Stand in front of the turned-off burner, within reach of the bye-pass tap, in such a way that the light, if turned on, shines in your eyes. Hold the time-table in front of you, and arrange the lighted candle behind, to throw light on your book at such a distance that it affords sufficient illumination to enable you to read the figures. Then turn up the incandescent light, and you will find you can no longer see the figures. What is the cause of more light disenabling you to see so clearly? To ascertain the reason try the second experiment. For it you require a bye-pass burner within reach, a candle as before, and a friend before you (whose eyes you can observe closely), so placed that when you turn up the light it shines into his or her eyes. With the burner turned off, observe your friend's eyes, and you will find the pupil dilated to such a size that little if any of the coloured portion of the eyes remains visible. Turn on the burner and you at once see the pupils contract until, if the light be bright and close, the pupils become mere black specks. Now the pupil of the eye is merely a hole through which the light passes to form an image on the retina. It expands and contracts spontaneously, to accommodate the eye to the brightness of the light. Bright light irritates the eye, and the pupil of its own accord closes and thus admits less light. The pupil acts precisely as stops do in a camera. With a small stop, you get a sharp image poorly illuminated, and *vice versâ*. The experiment may be made with one of the lower animals. In particular, a cat's eye lends itself excellently for observation.

With these experiments in mind, examine the average mode of lighting a shop window. Bright burners are arranged to shine in your eyes, causing the pupils to contract and prevent sufficient of the dispersed light (which renders objects visible) to enter the eye to form a properly illuminated image. Far less light intelligently placed, not to shine at all into the eyes, would enable the goods to be seen much more distinctly. Lights placed high up (with reflectors to throw the light down on to the goods) or hung outside the shop, are much more effective than lights put among the goods in the window; or if the lights must be low down in the window, shield the eye by large shades of opal, and so allow the pupil to remain wide open.

Popularity.

In this country popularity is deemed a valuable asset. It is an asset which is often bought too dearly. In my opinion, popularity and bankruptcy go hand in hand. When is the value of popularity manifested? It does not go hand in hand with cheap gas, as witness the vehement opposition given to the Wexford Provisional Order. What benefits has a Company ever derived from being popular? Acting justly, and so being able to keep a stiff upper lip, is the best preliminary to getting anything required. Week-kneed concessions to selected consumers, preferential treatment of councilors, and yielding to pressure from the Press, generally results in no profits, and always in loss of self-respect which is much more valuable than popularity.

My experience is that so long as a company is paying badly, it has a bed of roses; but so soon as there are the outward and visible signs of success, dissatisfaction arises. People do not dig far below the surface, either here or across the channel. Many companies which used to pay 10 per cent. on their capital had dissatisfied consumers, whose dissatisfaction vanished when the dividends were reduced to 5 per cent. on a doubled capital.

In suburban life, the tendency is to appear richer than one is; in the country—especially here—people like to die richer than they were thought to be. Whether this is due to the jealousy of success, it is hard to say; but it is characteristic, and any ostentation is disliked. Manifested success is not liked; but the greatest charity and consideration are extended to the unsuccessful. Consequently, if popularity be desired, it will be got by keeping up the capital, and paying a low dividend rather than by paying a high dividend upon a small capital even when the price of gas be lower in the latter case.

I feel that there is far too much talk nowadays about consideration being shown to consumers. We are told a lot about their being our best friends, the source of all our profits, and such clap-trap. Such assertions are unnecessary. How much friendship would have been displayed if the shareholders had not provided the money for building a gas-works. They have taken the risk of so sinking their money, and are entitled to recover it as they think fit. I do not admit that the shareholders are under obligation to the consumers any more than the consumers to the shareholders. In fact, I consider the consumer is under the greater obligation. He risks nothing; whereas the shareholder does, in order to supply the consumer with something which the mere fact of his buying and paying for, is a proof he desired to have. The shareholder will not have the consumers badly treated as it would not be profitable, and the proper treatment of consumers will come from the self-interest of shareholders much more surely than from any moral text-book aphorism. In conducting a gas-works, I feel it to be the manager's first duty to afford a good supply of gas at a saleable price; secondly to earn a reasonable dividend for the proprietors; then to improve the lot of employees; and afterwards to cheapen the gas to the consumers. Having got the three parties necessary to the running of a gas-works fairly treated, I consider that each should participate in any increased prosperity in turn. A rise in dividend should be followed by an increase in wages, and then a reduction in price, and so on. But no change should be made until the state of the exchequer renders it unlikely that the change may have to be abrogated.

In all the talk about moral obligations to consumers, the workmen are often left in the cold; and it is hateful to hear of reductions in prices being made by gas undertakings paying their men miserable pittances of 16s. and 18s. per week. What respect can consumers have for themselves getting cheap gas made by men trying to keep body and soul together on such wages, or how can shareholders take dividends earned that way.

Workmen generally are paid too little in Irish gas-works; and I would like to see a change in both their pay and treatment. We are too prone to forget that they are victims of their environment, and to judge them from our own idea. We blame them for their drunkenness: but what counter-attraction do we offer them to the pleasure of getting drunk? We blame their laziness; but what appreciation do we evince for energy?

It is not only workmen I hear blamed. In mixing with managers I often hear grievous complaints of councillors and of directors. It is seldom that a man doing well has bad directors. In an admirable book by Andrew Carnegie, he advises young men that bad masters are not the proper masters for them and that they should leave them. No good man need fear giving up his position under a bad master, as there are plenty of good masters looking out for good men. But masters and men are generally what we make them; and I would bring my remarks to a close by commending to you a few lines which if acted up to will make one see life through much rosier glasses—

"Seeke out the best in every man
And speeke of all the best ye can,
Then will all men speeke well of Ye
And say how kind of heart Ye be."

THE BRITISH ASSOCIATION MEETING.

Gas and Other Topics.

In another column we give some extracts from the lecture, on "The Manufacture of Light," delivered by Professor Silvanus Thompson at the recent meeting of the British Association in York. We here notice briefly some other topics in which our readers are interested.

Cheap Gas for Light, Heat, and Power.

Taking gas first, the only paper dealing exclusively with its supply was one by Mr. A. J. Martin, M.Inst.C.E., who put forth its claims as a valuable medium for the production of light, heat, and power. It was a subject he had previously dealt with on two occasions—at the Smoke Abatement Conference held in London towards the close of the past year, and at the Society of Arts a few months ago. The paper was fully noticed in our columns at the time; and the one read before the British Association was very much on the same lines. The author began by giving statistics showing the growth of the gas industry during the past quarter-of a-century, and others for a shorter period in regard to the supply of electricity. He pointed out that, in the field of lighting, the introduction of the incandescent mantle and of methods of burning gas under pressure, placed this illuminant on terms of equality with electricity. For power production, each had its special field; and in point of cost, illuminating gas at 4s. per 1000 cubic feet was about equivalent to electricity at 1d. per unit. For heating purposes, it was by far the more economical fuel; 1s. spent in gas at 3s. per 1000 cubic feet yielding five times as much heat as a shilling's worth of electricity at 1d. per unit. The capital expenditure required to furnish a given power by means of electricity would, speaking generally, be very much heavier than that needed to furnish the same power by gas.

Mr. Martin then passed on to emphasize the need for cheap power all over the country, and to show that the claims of gas to be able to supply it had been overlooked, owing to attention being fixed upon electricity. It was, however, he said, a much more useful servant; and its neglect was largely due to the fact that it was introduced solely as an illuminant. This conception of the function of gas continued to dominate the modes of its manufacture and distribution; and users of heat and power were thereby deprived to a great extent of the benefit they would obtain from a supply of gas appropriate to their needs. In default of such a supply, the greater part of the heat and power used in this country was obtained direct from coal, the burning of which in its raw state was denounced as a barbarous practice by the late Sir William Siemens.

Having dealt with the subject of the possible exhaustion of our coal supplies, and laid stress, as he did in his Society of Arts paper, on the desirability of checking the waste which now goes on, Mr. Martin proceeded to expatiate upon the advantages of gaseous fuel, and to enunciate the opinion that its high price was the main obstacle to its more general adoption. He pointed out that while the consumers in Widnes pay only 11d. per 1000 cubic feet, those in some other places have to pay as much as 7s.; and the average is about 2s. 8d. Speaking generally, Mr. Martin said the high price of gas was due to one or more of the following causes: The large capital involved, antiquated and inefficient plant, highly rented and rated sites, the illuminating standards to which the gas had to conform, the high prices paid for coal, and, in very small undertakings, the disproportionately high cost of management and of distribution. The first two causes were the natural outcome of the slow growth of a great industry from small beginnings. The influence of the first and third was reduced with every increase in consumption, whereby the capital and other fixed charges were spread over a larger volume of gas. The old plant was being replaced with newer and more efficient types as opportunity offered; and in these days of Welsbach mantles, if the illuminating standards could be done away with, the gain to the consumer would amount to many millions of pounds per annum.

Mr. Martin now came to the chief point in his paper—the long-distance transmission of gas, which he said had lately been regarded as impracticable for the following reasons: (1) Loss of illuminating constituents by condensation in the compressors and mains. (2) Leakage in course of transmission. (3) Difficulty in disposing of coke. (4) Amount of capital required. (5) Loss by supercession of existing plants. These reasons he dealt with at some length, and then gave particulars of the scheme of gas supply from the coalfields which he had worked out for London. He reckoned that the total cost of gas delivered to the compressors would be 5⅜d. per 1000 cubic feet. The expenses of compression and transmission would bring up the cost of the gas made at the pit's mouth, delivered into the existing gasholders, to 7d. or 7½d. per 1000 cubic feet. As the average cost of the gas sold in 1904 by the three Metropolitan Gas Companies, as delivered into the holders, was 12·85d. per 1000 cubic feet, there would be a saving of 5·35d. if gas instead of coal were transmitted from the pit's mouth. Mr. Martin pointed out that the larger cities and towns in Lancashire and Yorkshire are all within easy reach of coalfields, and could, he said, well afford to lay down pipe-lines of their own, the cost of which he tabulated as follows:—

	York.	Leeds.	Manchester.
Gas sold in 1904	497,363,000 c. ft.	2,869,684,000 c. ft.	4,780,510,000 c. ft.
Price	1s. 11d., 2s. 2d.	2s. 3d.	2s., 2s. 4d., 2s. 7d.
Diameter of main	8 inches	15 inches	19 inches
Cost of compressor plant and pipe-line	£70,000	£240,000	£380,000
Cost of transmitting present supply	£5,300	£12,500	£19,000
Cost per 1000 cubic feet	2¼d.	1d.	1d.
Cost of transmitting five times present supply	£8,000	£28,000	£45,000
Cost per 1000 cubic feet	¾d.	¼d.	¼d.

In conclusion, the author said that, in order to carry out his proposals in their entirety, the co-operation of many interests on a very large scale would obviously be required. A plan which appeared to offer some advantages was that every interest involved, including the colliery owners, the companies formed to make, compress, and transmit the gas, and the undertakings deriving their supply from the pipe-lines, should preserve its administrative independence; each supplying or receiving coal or gas, as the case might be, at a scale of prices to be settled from time to time by a Central Committee on which all interests should be represented. Such a plan would, he thought, secure to the consumer the lowest possible price for his gas, and would do away with the haggling and clashing of interests which would inevitably arise under a system of bargaining and unrestrained competition.

Radiation from Incandescent Mantles.

Mr. James Swinburne read a paper in the Physics Section on the nature of radiation from incandescent mantles. He said the ordinary explanation of the great luminous efficiency of the gas-mantle was that rare earths have a property of selective radiation, in virtue of which they send out a larger proportion of their radiant energy in the form of light than ordinary hot bodies. Other explanations were that there is catalytic action going on; that cerium has two oxides, and oscillates between the two states —thus producing the effect. Another explanation was that the bunsen flame is really very hot, and that the mantle is of such low emissivity that it gets rid of such a small amount of power that there is little difference of temperature between it and the flame, and it is therefore hot enough to give the light by pure temperature radiation. His view was that the simple temperature explanation fits the phenomena; and he considered the catalytic action theory as vague. He remarked that generally catalytic action merely accelerated a change from unstable to stable equilibrium. It was difficult to see how it could affect radiation. But a suggestion might be made: The gases in the hot shell combine at a certain rate, and the flame radiates heat and comes up to a certain temperature. If the mantle causes quick combination intimately among its own particles, it may be possible that the temperature there may be higher than in the flame itself, so that the mantle may really be hotter than the flame.

Cheap Electric Lamps.

In a paper on "Glow Lamps Up to Date and the Grading of Voltages," Sir W. H. Preece, K.C.B., F.R.S., condemned the cheap lamp, which, he said, proved to be a swallower of energy and a costly agent. The persistent use of an inefficient lamp was senseless and extravagant; many a user paying for twice as much energy as he needed. The chief remedy was to make the correct rating of lamps imperative, and falsification of brands must be made illegal. Testing was the only means we possessed to secure efficiency and prevent fraud; and every authorized distributor who could afford it should contribute towards the maintenance of a well-equipped lamp-testing laboratory, established on a commercial basis, for testing and certifying all the lamps purchased. It was for them to show the consumer how to check and prevent

waste. "It is somewhat humiliating," said Sir William, "and certainly should excite earnest thought, that nearly all the recent advances in developing electric and gas lighting in this country have emanated from Germany or America. Is the Lion asleep? Are we wasting our energies in religious discussions? Is the spirit of enterprise abroad? Is our abundant money poured into less profitable undertakings? Are we checked by grandmotherly legislation? Something is wrong somewhere. The one thing I wish this paper to expose is the shocking technical ignorance of the ordinary householder, the absence of any legal power to protect the user in the quality of his electrical apparatus purchased in the open market, and the apparent growing decay of honour among our manufacturers. 'Made in England' is daily becoming a reproach to us."

Suction Gas for Motive Power.

It is only within the past few years that suction-gas plants have become practical sources of motive power; and much interest attached, therefore, to the paper on the subject read in the Engineering Section by Professor Dalby. The extraordinary feature of the suction plant, he pointed out, was that an engine could go on working continuously, and its operations could go on hour after hour and week after week, so that the explosive mixture made in the mixing-chamber and the power developed by the cycle of operations in the cylinder were automatically regulated to enable the engine to run on a variable load without the necessity of altering the position of a single valve or handle. In order to secure a continuous supply of gas, the producer must be designed so that the fuel could be put into the furnace without at the same time introducing air; the water required for regulating the quality of the gas should be supplied from an external source at a constant rate; and the rate of combustion in the furnace should be constant, and the fire be uniformly hot. With a suction plant, air leaked inwardly; and the danger from poisonous gas was small, provided the plant was properly installed. Should sufficient air leak inside to cause an explosion, the water seal would blow off, and in this way act as a safety-valve. The seal thus served the double purpose of collecting dust brought down the gas-pipe and of acting as a safety-valve. In the course of a short discussion, Colonel Crompton said that suction-gas plants were bound in future to profoundly modify the question of power supply all over extended areas, because it was found that power could now be obtained as cheaply with them as from the large power companies.

Tar for Waterproofing Roads.

With the advent of motor-cars, the solution of the problem of getting rid of the dust on roads has become one of the utmost urgency. The question was brought before the Engineering Section by Professor Mackenzie; and his proposed remedy for the problem—waterproof roads—engaged earnest attention for a considerable time. He said waterproof roads were all-important for the efficiency of roads bearing heavy traffic, as under the rapid passage of a rubber-tyred motor-car a real remedy for the dust nuisance must involve an improvement in the road surface; and it was eminently desirable that it should result in a real economy to the ratepayers, and a reduced cost for maintenance. Dust originated in binding material which lost its cohesion when it dried. The most practical method of waterproofing at the present time was to paint the road surface by hand with a distilled tar. When this tar was applied for the first time, a second coating was necessary about a month later; and after that it was the practice to apply one coat every year. Waterproofing on this system was very effective for about six months of summer weather, after which it rapidly deteriorated, and by the end of twelve months the tar had to all intents and purposes disappeared. Unfortunately the tar binding resulted in a terribly greasy, slimy mud in the winter months, which trod into the house, and ruined any clothes upon which it might be splashed. It was also found in the summer months that the light dust which did arise from the roads contained a preparation of tar which ruined curtains, linen, &c. He suggested that it was really necessary to find some improved method for toughening tar. The volatile parts of tar became very brittle in cold weather, and fractured under heavy traffic. If it could be toughened so as to be brittle, and yet remain hard in hot weather, a satisfactory waterproof material would result. The most successful material so far was quarrite, which had been used for the Blackpool Promenade. Manufacturers of this material stated that toughened tar would adhere to it; and if this were borne out by experiment, it would be of immense value. In conclusion, Professor Mackenzie stated that he had made close observation of many of the experimental sections of roads waterproofed in various parts of the country, and he was convinced that as soon as we were in possession of more knowledge, waterproof roads would be found to be the solution of the dust problem, and their increased life would result in a marked economy in road maintenance and a resultant reduction of the highway rate. An exhaustive experiment was necessary, where all the materials could be placed down in sufficient lengths to really study their wear and life; and these lengths should be contiguous, so that they would all be subjected to identical traffic. The data thus obtained would be of national value; for it was a matter for congratulation to learn that there was a reasonable prospect of such an experiment being carried out on one of the main roads out of London. Once it was established that waterproof, dustless roads would reduce the highway rate, their gradual introduction would only be a matter of time.

RAILWAY CARRIAGE INCANDESCENT LIGHTING.

A paper on the above subject was read some time ago by Herr H. Gerdes, of Berlin, before the German Association of Mechanical Engineers, and was printed shortly afterwards in "Glasers Annalen für Gewerbe und Bauwesen."

The author began his paper by remarking that the quality of gas oil has been steadily deteriorating for a good many years, because increasing proportions of paraffin have been removed from it; but that up to a certain point the reduction in the illuminating power of the oil gas has been neutralized by the invention and use of better burners. When, however, the earlier imperfections of the incandescent mantle were overcome, some attempts were made (even so far back as in the year 1894) to employ incandescent burners in railway carriages. About the same time acetylene was introduced into commerce; and, as a rival to incandescent oil or coal gas, it met with a considerable measure of success, when used as an enriching agent in oil gas consumed in self-luminous burners. Experiments with neat compressed acetylene were unsatisfactory, owing to the dangers accompanying the compression and to the accidents that followed its utilization. But acetylene oil-gas was found to give a better light than could, at the time, be obtained from even good oil-gas, though in certain places trouble was experienced through the choking of the burners and the consequent blackening of the reflectors. Nevertheless, attention was never diverted from the problem of adapting the incandescent system of lighting to railway carriages; the pioneers in this direction being the Eastern Railway Company of France. Experiments were also carried out by the German State Railways in Alsace-Lorraine; the authorities being stimulated in their work by the bad accident that occurred at Strasburg in the factory where acetylene oil gas was manufactured for self-luminous combustion.

Several railway companies which did not possess their own plant for making oil gas—notably the Western Company of France—turned their attention to the combustion of compressed coal gas under mantles, and obtained most excellent results.* Before the advent of the mantle, the low illuminating power of coal gas after compression, and the consequently large volume that it was necessary to carry on each train, rendered coal gas a less efficient illuminating agent than oil gas for carriage lighting; but burnt under the mantle, the relative disadvantage partially disappears, though it is still requisite to carry 2·5 times as much coal gas as oil gas, or three times as much coal gas as acetylene oil gas, for the development of an equal amount of light.

The first railway experiments with incandescent lighting were thus made chiefly with oil gas, but partly also with coal gas and with oil gas enriched with acetylene. The burners were upright, slightly modified from the ordinary domestic type; but inverted burners were tried soon afterwards. By the close of 1905, Herr Gerdes reckons that some 3500 railway coaches in different parts of the world were fitted with incandescent burners. Over two-thirds of these were in France; the Western line alone having 1300, and the Eastern 760. In Austria there were 124, in Germany 119, Russia 5, Sweden 2, the United States 250, and in the Argentine Republic 11. Herr Gerdes' total for the railway coaches in the British Empire provided with incandescent burners is 303; 199 being within the British Isles. At the time mentioned, the Great Western line had 100 carriages, the London and South-Western 24, and the London, Brighton, and South Coast 23 consuming incandescent gas. No other company at home had more than 9. The Australian railways, however, had 58, and the Indian lines 44.

Reviewing the present position of incandescent railway lighting, Herr Gerdes observes that a gas of high calorific value is desirable, and that therefore in the production of a given amount of light more heat units must be supplied from coal gas than from oil gas or acetylene oil-gas. Nevertheless, and in spite of what has already been said about the extra cost of compression, coal gas may be used with advantage on small railways, and by such as have no gas plant of their own. Acetylene oil-gas yields most light for a given number of heat units; but the mantles fail more rapidly with it than with either of the other gases. An oil gas less highly enriched with acetylene than usual—*i.e.*, a gas containing only 10 per cent. of acetylene—is practically identical with ordinary oil gas so far as the lifetime of the mantles is concerned; and this, according to the latest French experience, may be taken at about 70 days for an upright mantle, and 45 days, or about 200 burning hours, for an inverted one. The longer life of the former is explained by the circumstance that the hottest part of an atmospheric gas-flame is close to the point of ignition. An upright mantle, therefore, begins to fail at its lowest part; but its upper part remains intact, and the quantity of light emitted does not decrease so seriously. An inverted mantle, for the same reason, begins to fail at the top; and when this happens, it is soon entirely destroyed. Hence the Paris-Lyons-Mediterranean Railway Company have determined to fit the whole of their passenger rolling stock (about 4000 or 5000 coaches) with upright incandescent burners; whereas the International "Wagons-Lits" Company have decided to fit inverted burners to all their stock.

As regards the use of acetylene oil-gas under mantles, it may be remarked that a reduction in the proportion of acetylene from

* See "Journal," Vol. XC., p. 959.

25 per cent. (its original figure) to 10 per cent. may be made without greatly affecting the light in the carriages, if only the burners are suitably increased in size. A 27-litre burner consuming 25 per cent. of acetylene oil-gas yields practically the same light as a 35-litre burner fed with 10 per cent. of acetylene oil-gas; and at present German prices the manufacture of the latter is more economical. Many of the factories where the mixed gas is made are only introducing 10 or 15 per cent. of acetylene now; and the effect of the new tariff may well be to favour the introduction of a low percentage of acetylene into an oil gas of good quality, rather than an introduction of a higher proportion of acetylene into an inferior oil gas—the incandescent illuminating power of the mixed product being the same in either case.

Some tests showing the relative efficiencies of different gases in different types of burners are given in the accompanying table; the figures having been recalculated into British data. The oil gas was made from Saxon brown coal tar oil containing paraffin. Its net calorific power, measured at 760 mm. pressure and a temperature of 18°C. was 1058 B.Th.U. per cubic foot. The first acetylene oil-gas contained 10 per cent. by volume of acetylene, its calorific power being 1110 B.Th.U. The second acetylene oil-gas contained 25 per cent. of acetylene, as made at the Silesian Railway Station in Berlin, and its calorific value was 1175 B.Th.U. All the gases were tested after compression to 11 atmospheres absolute, and their prices (in German conditions), including compression, were 32, 43·8, and 61·5 pf. per cubic metre respectively. The fishtail burners were supplied with gas at a pressure of 57-10ths; the incandescent burners at 6 inches.

The illuminating powers of the fishtails and the upright incandescent burners were measured horizontally. The inverted burners were of the latest type, three different specimens being examined, which consumed 0·636, 0·92, and 1·185 cubic feet per hour respectively. As the results were very similar in all cases, the figures in the table are averages given by the three burners. The illuminating power was measured at a depending angle of 18°. It should be understood that only one burner and one mantle of each size were used throughout the tests of the three different varieties of gas. The figures prove that acetylene oil-gas affords five or six times as much light per unit volume in an incandescent burner as in a fishtail; the corresponding proportion being greater in the case of unenriched oil gas.

Gas and Burner.	Consumption per Hour. Cubic Feet.	Illuminating Power. Candles.	Candles per Cubic Foot.	Candles per 1000 B.T.U.	Comparative Light per Unit Rate of Consumption.
Oil Gas.					
Fishtail No. 40	0·954	4·95	5·2	4·9	1
Upright incandescent . .	2·58	154	59·8	56·2	1
Inverted ,, . .	0·913	53·6	59·0	55·6	1
Acetylene Oil-Gas (10 : 90).					
Fishtail No. 60	1·24	12·1	9·76	8·8	1·881
Upright incandescent . .	2·56	163·5	64	57·7	1·071
Inverted ,, . .	0 913	59·6	65·4	59·0	1·105
Acetylene Oil-Gas (25 : 75).					
Fishtail No. 40	0·954	12·1	12·7	10·9	2·44
Upright incandescent . .	2·56	193	75·4	64·3	1·265
Inverted ,, . .	0·912	68·4	74·9	63·9	1·262

Herr Gerdes advocates providing the inverted mantles with wire jackets, so that the glass and reflector of the burner can be cleaned without risk. Spare mantles should be carried in each coach—the wire jackets being attached to them. Hence the train attendant can easily replace without trouble any mantle which may fail during the journey. The lanterns are usually fitted with pilot flames, which can be lighted at any station where the train stops, or even during the run. All the lamps are then turned up at the proper time from the main cock on the coach; each lamp being also under the control of the passengers.

THE USE OF TAR FOR ROADS.

In the last number of the "JOURNAL," we published some particulars in regard to the trials which have been made in this country with the view of abating dust on roads, and improving their surface by the use of coal tar. It may be of interest to supplement the details then given by some which appeared in the "Journal für Gasbeleuchtung," by Dr. Guglielminetti, of Monte Carlo and Paris. A translation of the article was made by Mr. Frederic Egner for the "American Gaslight Journal," from which it is here reproduced.

Four years have passed since the publication of our earliest successes with tar coating streets and roadways at Monaco and Paris. At first this method of treating roadways gave rise to some misgivings on the part of tar and asphalte experts, and especially among street engineers, who doubted whether a thin coat of tar upon the surface of much-used roadways would for weeks—to say nothing of months—be able to successfully resist the formation of dust. To-day, after four years of observation of a number of kilometres (1 kilometre = 0·62 mile) of streets tarred in the manner hereinafter described, the French street engineers have given their verdict on the subject; and in order that all countries might profit by the experiments made in France, and for the sake of street hygiene, we give this abstract of the report concerning the tarring of roadways, which was published in the "Annales des Ponts et Chaussés."

M. Heude, the Engineer of the Department of the Seine and Marne, reported that he tarred, in the summer of 1903, about 215,200 square feet, in 1904, twice as much, and in 1905, more than 1,291,200 square feet; and he asserts that the results were throughout excellent. The dust resulting from the wear of the streets had almost entirely disappeared, and naturally the "wear" itself was enormously reduced, which meant longer duration. This, together with the reduction in cost for maintenance, more than pays the first and subsequent outlay on the installation of the street-tarring apparatus. And whereas formerly the sprinkling and cleaning of the streets cost considerable sums, this method actually caused a net profit of 1 c. per square metre (10·76 square feet) for the year. It is by no means any longer an experiment; the method has been demonstrated to be practical. In summer there is little dust; in winter but little mud. On all newly made streets, the roadways will henceforth be tarred.

M. Sigault has made the following statement: As the best evidence of the excellence of the new method, it may be mentioned that the residents of our communes request its use, and willingly volunteer to share in the first cost of its installation. The method was somewhat rapidly introduced. In the year 1902, only three of my Superintendents commenced tarring; while now eight of them are doing it. He speaks of the following decisive experiment: A much-used roadway was made for 3608 feet in 1902. For a distance of 1640 feet this roadway was tarred then and also in the following three years. At the end of 1905, the tarred end of the road was still in entirely good condition; while the portion which was not so treated had to be re-covered in the course of the year. Another experiment: Two adjoining identically conditioned portions of a roadway, each having an area of 1100 square metres, were newly covered in 1902. One of these sections of road was tarred, the other not. The following winter, the untarred section had to be swept nine times, and the tarred one only once. From the untarred section, 24 cubic metres of mud had to be removed; from the tarred one, only 2 cubic metres, and this was mostly brought on to it from the adjoining sections. With the view of preserving the roadway, the section having to bear the heaviest traffic was tarred. These two experiments were convincing.

M. Girardeau, of Fontenay-le-Comte, claims, after many years of experience with the system, a saving of 25 per cent. in the maintenance of streets by means of it. M. Vasseur, the City Engineer, of Paris, had about 50,000 square metres of streets surrounding the Parc Monceau tarred; and he is very pleased with the results. No one now complains about insufficient sprinkling of the street, and the residents can once more keep their windows open all through the day. M. Arnaud, the Engineer of the Department of the Seine, considers the tarring of the streets as a most excellent and practical means of suppressing dust.

Streets around Paris, which before the tarring required recovering every three or four years, were tarred during the summers of 1903, 1904, and 1905, and are now in such good condition that there will be no need to re-cover them for some years to come; and one year's postponement would richly pay the cost of all the tarring.

The method of doing this may be gathered from the brief description given, of which the following is a free translation: In the heating-waggon, the cold tar is poured into a vessel over which is situated a large heating-kettle—a closed vessel like a boiler, connected with a small steam-boiler. The arrangements are that steam may be blown direct into the kettle or boiler, or, if desired, can be conducted into spiral pipe-coils inside. The kettle is first filled directly with steam; then cold water is poured over it, causing the steam to condense, and the resulting vacuum draws about 260 gallons of cold tar up into the kettle, through a pipe which connects it with the tar-reservoir on the waggon. Steam is admitted into the coils, and the tar is brought up to a temperature of about 212° Fahr., and at the same time steam is also admitted into the kettle direct, by which means the boiling tar is forced down and through a pipe into the sprinkling-waggon standing alongside. As soon as the heating-kettle is empty, the steam is again condensed as before, and the operation repeated as often as may be necessary.

While in these days of "automobilismus" a durable effect can only be obtained by either sprinkling the roadways so heavily as to form mud, or else sprinkling lightly every hour, which tends more or less to hinder free traffic on the sections of road undergoing treatment for the time being, tarring reduces the dust nuisance to an inconsiderable minimum, for which a light sprinkling twice each day will suffice to obtain a really satisfactory result. No mud is formed on the water-tight surface any more than with asphalted streets. Tar asphalte roads will last from eight to ten months, while asphalte pavement will last eight to ten years. But the latter costs 15 frs. per square metre, whereas the tar asphalte costs only one-hundredth as much; and even this small sum is recovered in the saving by the lesser cost in maintenance and wear of the roadway. This advantage, from a financial point of view, has overcome many an engineering official objection when the hygienic advantages were entirely ignored. Very likely it was also the financial aspect of the matter which caused more attention to be given to the mechanical means to accomplish the work, and led to the former primitive method of

heating the tar, and then, by means of hand sprinkling-cans, brooms, and much labour, spreading it evenly over the surface of the roadway, being superseded.

By the new arrangement, more than 107,600 square feet can be tarred in less than four hours. The tar-sprinkling waggon carries a large barrel, out of which the tar flows into a basin in which the pressure is always the same. From this basin the tar flows into a distributing-pipe with holes, calculated on the distance of a horse's step, and in this distance about 600 grammes of tar are distributed over each square metre of surface (1·32 lbs. tar to each 10·76 square feet). Since 2·64 lbs. are required for each square metre to make a good job of it, the same ground is passed over twice. As the brooms at the rear end of the waggon distribute the tar automatically, one labourer is enough to follow the waggon to fill in possible vacant spaces which the revolving brooms could not reach. To ensure the best results, the work should be done during clear, warm weather; the roadway should be well cleaned and perfectly dry; about 2¾ lbs. of tar used to every 10¾ square feet of roadway, put on as hot as possible, and well spread; and over all a little sand should be sprinkled. One-half of the street (in width) is tarred at a time, and then the tarred portion should be closed to traffic for 24 hours. If these directions are followed, the success of the work is assured.

To partly meet the expense of the first tarring of a roadway, the financial aid of the public, which is certainly interested in the highest degree by this improvement, would be desirable. Owners of hotels, shops, and tradesmen of all sorts, who are more or less affected by the dust nuisance, and physicians and others who may well find it to their advantage to see a system inaugurated which will positively eliminate dust from streets and roadways, ought to combine and use such means as they can command to bring about this really possible and so greatly desirable result.

To these words the translator appends a suggestion or two Owners and users of automobiles or carriages of any sort might be added to the list of those who are interested in seeing the street dust laid. So are pedestrians who are obliged to walk either for business or pleasure. And last, but by no means least, the tar producers should take a little trouble to bring this subject to the notice of the people who suffer by reason of the dust nuisance, and of the officials who can—now that a way has been shown by such good authority as is herein quoted—lay the dust. Railroad companies also might find it to their financial interest, as well as greatly to the comfort of their passengers and other patrons, to give this method of dust prevention their serious and favourable consideration. In this connection they might take notice that coal tar is not exactly a fertilizer, but quite the contrary, and by a light occasional sprinkling of their roadbeds, weeds would be annihilated and kept away, and iron as well as wood coming under the tar-sprinkler would experience a lengthening of life and usefulness, much to the financial advantage of the company who might give the recommendation serious thought.

HYGIENIC ILLUMINATION.

[Communicated.]

The annual meetings of the British Association for the Advancement of Science usually include one or more which are intended for the general public. On these occasions, the operative classes are informed, by means of lectures, as to notable advances in Science, and more especially as to the practical applications of scientific knowledge. At a gathering of this character held in connection with the meeting of the Association in York, Professor Silvanus P. Thompson discoursed upon the "Manufacture of Light," and appears to have done so largely by comparing the hygienic effect of gas and electric lighting.*

None could raise any objection to the importance of the subject, or its suitability for scientific treatment before a popular audience; but the fragmentary manner in which it was dealt with is to be regretted. Not only was the treatment fragmentary, and therefore one-sided, but it was, to say the least, inclined to be of a sensational order rather than soberly scientific. To describe the product of combustion (carbonic acid) as a "poison," is an exaggeration that could only, in this connection, be regarded as permissible if all the other deleterious gases produced by electric arcs and electric flame arcs had been catalogued and similarly labelled according to the degree of their harmfulness. The last column of the table given by the lecturer is calculated to raise alarm in the mind of the ordinary reader; but its real value would have been more apparent if it had been headed "Cubic Inches of Carbonic Acid *per Candle-Hour*." Even with this correction, it is necessary to bring into the reckoning the other factors that go to determine the vitiation of the air in compartments artificially lighted by gas or electricity. The sterilizing effect of a flame upon bacteria, the circulation of air and the ventilating effect of hot gases, even when imperfectly directed, are factors in favour of the older illuminant that must be brought into account; and, indeed, they are in practice so regarded by the millions of the general public.

If, however, Professor Thompson's figures be discussed in their academic signification alone, why should they not be made more complete by the inclusion of the nature and quantity of the other deleterious gases given off by arcs and flame arcs? The fact that arcs give out nitrous acid gas (otherwise spoken of as "nitrous fumes") is well known; and this was an important consideration in the recommendations of Professor Percy Frankland, in the lighting by gas of the Birmingham Art Gallery. But it is not so commonly known that attempts to improve arcs by flame arcs have brought similar, but worse, troubles in their train. As a direct result of the competition of incandescent gas-lights, which furnish a convenient and economical unit of illumination for all purposes, electricians have been seeking to provide a light that shall in some degree approach it in usefulness, with the result that carbons fitted with cores consisting of fluorides have been used. These carbons suffer from being much more costly, and burning out more rapidly, than ordinary ones, at the same time producing hydrofluoric acid gas—a dangerous and poisonous substance. These drawbacks, added to the unsightly and opaque deposits of salts on the interior of the globes used with these arcs, have hitherto prevented the extended use of these products of electrical inventive skill.

Recognizing the highly injurious character of hydrofluoric acid upon the human organism, other substances than fluorides are now being experimented with to provide the "flame arc" in a less objectionable manner. Whether these are destined to be any more satisfactory than their predecessors, time only can show. Meanwhile, gas engineers may take encouragement from the fact that a "flame" is regarded as a desirable medium of light; and they will therefore go on perfecting the gas-flame so as to continue to out-distance all competitors.

* Some extracts from the lecture referred to by our correspondent appear on p. 449 of to-day's issue of the "Journal." The matter is also discussed in our editorial columns.—Ed. "J.G.L."

Disinfection as a Means of Water Purification.

In the course of the proceedings at the annual meeting of the American Water-Works Association last month, a paper on the above subject was read by Mr. G. C. Whipple. It elicited from Professor W. P. Mason the remark that, though an able production, it was in advance of the times, and covered ground that it will be necessary to take in years to come. He very much questioned whether the public at large will be willing to disinfect water. He considered it an open question, also, how polluted a water must be before it had to be rejected as a raw supply. He cited a number of cases where filtration and disinfection had been employed, and concluded by saying that he believed as much could be done with ordinary filtration, whether by the mechanical or the English bed system, as the requirements of the present day called for; and that the people were not ready to disinfect water so long as raw water of a sufficiently good character could be secured. Professor Leonard C. Kinnicutt did not quite agree with Professor Mason that disinfection of water supplies was entirely a question of the future. He believed that in certain cases chemical disinfection was necessary, especially as regards the purification of water for armies in the field. In closing the discussion, Mr. Whipple said he did not wish any one to infer that he did not mean to be entirely conservative. However, it was perhaps not well to indiscriminately condemn the use of disinfectants, or to decry conclusions arrived at after careful study and experiment, which certainly should be preferred to a haphazard or random treatment of the subject.

The Water-Softening Process at St. Louis.—At the recent meeting of the American Water-Works Association, Mr. W. F. Montford presented data with reference to the results of the water-softening process at St. Louis, derived from daily determinations of calcium and magnesium in both river and treated water. The water treated had a carbonate alkalinity varying from 94 parts to 148 parts per million, or an average of 134 parts per million reckoned as calcium carbonate. This was reduced by treatment to an average of 42·6 parts per million. The total calcium in the river samples averaged 42·79 parts per million; while the treated water averaged but 22·1 parts. The magnesium content of the raw water was reduced from 10·85 parts to an average of 4·108 parts per million.

Sodium Hyposulphite in Gas Analysis.—According to the "Berichte," Herr H. Franzen uses sodium hyposulphite as an absorbent for oxygen. In Hempel's apparatus, the pipette is filled with rolls of iron wire gauze, and the solution used is made by dissolving 50 grammes of the salt in 250 c.c. of water, and adding 40 c.c. of sodium hydroxide solution (500 grammes of hydroxide dissolved in 700 c.c. of water). Of this solution, 1 c.c. will absorb about 10 c.c. of oxygen; and standing for five minutes in the pipette is enough. In Bunte's burette, a solution of 10 grammes of hyposulphite in 50 c.c. of water, to which has been added 50 c.c. of 10 per cent. sodium hydroxide solution, is used. This reagent is cheaper and much more comfortably handled than pyrogallol; can be used in the presence of carbon monoxide; and absorbs as readily at low as at high temperatures. It is stated that comparison with analyses by other methods has fully proved its accuracy.

BRITISH ASSOCIATION OF WATER-WORKS ENGINEERS.

ANNUAL MEETING AT SCARBOROUGH—JULY 12 to 14, 1906.

PAPER READ.

THE PARSONS TURBINE.

By F. G. HOLDEN, B.A., Assoc.M.Inst.C.E.,

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The year 1884 saw the successful construction of a compound steam-turbine, of about 10-horse power, running at 18,000 revolutions per minute and driving a dynamo. From this beginning the purely rotary engine, so ably developed by the Hon. C. A. Parsons, has gone on increasing in size, economy, and favour; so that now we find the two new Cunarders, the largest and fastest liners in the world, as well as the largest battleship, the recently launched "Dreadnought," all being fitted up with the Parsons turbine machinery. It was, however, in the generation of electricity that the turbine was developed in its early days—Scarborough being the third supply station to entirely adopt the direct-driven turbine system; the two previous pioneers being the Newcastle and District Company and Cambridge. The Scarborough plant now consists of seven turbines—viz: two 500 K.W. alternators, two 300 K.W. continuous-current generators, and three smaller sizes, making 1945 kilowatts in all. One of the small turbines will be open when you visit the works, so that you will be able to see better than this paper can tell you the interior economy of a turbine. Perhaps it would be as well, however, to give a short description here, although the Parsons turbine has been so frequently described in various papers and articles.

Fig. 1 gives a section of the turbine, and fig. 2 shows diagrammatically the position of the fixed or guide blades and of the moving blades. Fig. 1 shows the turbine to consist of an outer casing, enclosing the revolving spindle which increases in diameter from the steam end to the exhaust; the outer casing varying in a similar manner. The space between the spindle and the case is occupied by alternate rings of fixed and moving blades; the fixed ones almost touching the spindle, and the moving ones the case. The latter project radially from the spindle, and the former, which give the necessary deflection to the direction of the steam in its path, project inwards from the case. Undercut grooves

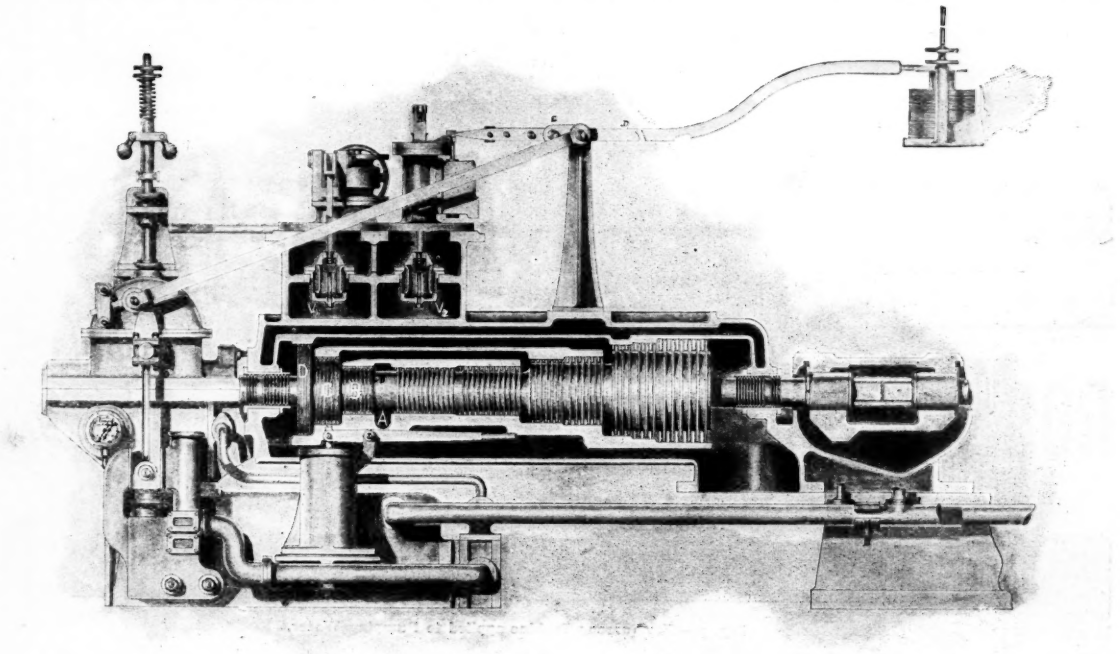


Fig. 1.—The Parsons Turbine. Section showing the Internal Construction.

are cut in the casing and spindle, into which the blades are keyed.

As the steam enters at A, it is deflected by the first row of fixed blades, so that it impinges on the first row of moving blades and thus causes the spindle to rotate. It then passes to the second row of fixed blades, and is again projected on to the second row of moving blades, thus increasing the rotational force. The same process takes place at each successive row of fixed and moving blades, until the steam exhausts to the condenser. The energy to give the steam

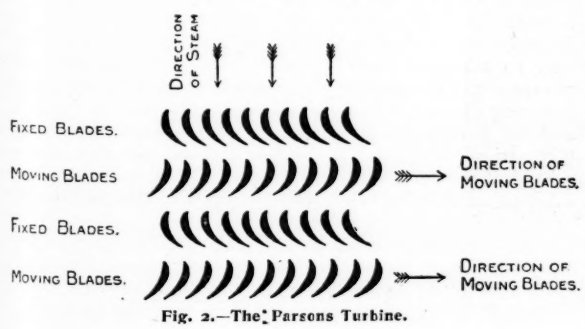


Fig. 2.—The Parsons Turbine.

its high rotational velocity at each ring is supplied by its drop in pressure, and the steam expands gradually right through the turbine. As the steam pressure drops, the blades become of larger area. At the steam end of the spindle are grooved pistons or dummies, B, C, and D, which fit into corresponding grooves in the cylinder. These are to counteract the end thrust caused by the steam passing through the turbine; and passages affording direct communication between each section of the spindle and the dummy of the same size are therefore provided. At the extreme ends of the cylinder are steam-packed glands, making steam-tight joints with the spindle. These prevent leakage of air, and loss of vacuum, at the only points in the engine where such leakages are possible. The bearings are each formed of a gun-metal bush surrounded by three easy fitting concentric steel tubes. The oil, which is fed under pressure between these tubes, forms thin uniform films, which keep the shaft central and damp-out vibrations.

Steam is admitted to the turbine first of all through an emergency valve V_1, which in case of excessive speed arising from any cause automatically cuts off the steam from the turbine. Thence it is admitted in a series of gusts by means of a double-beat valve V_2, the periodic opening and closing of which is regulated by means of a steam relay deriving its motion from a lever actuated by the main spindle of the

turbine. The duration of the gusts is controlled either electrically or mechanically, both systems giving satisfactory results in regard to steadiness of running, and also adapting themselves, practically instantaneously, to all variations in load. At our electricity works here, we installed a booster to deal with the sudden peaks that are obtained from a small tramway system; but we found that the turbine adjusted itself automatically before the booster had, as it were, begun to think about it. The exhaust steam from the relay is used to pack the steam-glands.

Among the advantages of turbines are the small number of moving parts, the small space occupied, the light weight as compared with the reciprocating engine, and consequently the small foundations required. In our own case, owing to settlement of the foundations, the main engine-bed was on one occasion out of level 10 inches at one corner and 4 inches at the other; but it made no difference to the smooth running of the turbines. No holding-down bolts are required; in fact, all the machines here are placed on hard wood blocks laids on the oil trays. These trays stand on the levelled face of concrete arches, which spring from two girders bedded on the main walls and supported in the middle (where the heavy electrical part of the machinery comes) by brick piers. Another advantage is that, as there are no rubbing surfaces in the cylinder, no internal lubrication is required; and consequently the exhaust steam is entirely free from oil. Thus the condensed water can be pumped direct into the boiler without filtration.

As an indication of the economy of oil, it may be stated that the cost of oil here for the last two years, for an output of over a million and a third electrical horse power hours, was £33 in 1904, and £27 in 1905, including all the oil used on the works for the turbines, feed pumps, and all other auxiliaries.

With regard to repairs, the total cost in 1904 for seven turbines developing 2600 E.H.P., one of which is 13 years old, was £48. Last year (1905) the cost was £87; and £51 of this was for setting-up and overhauling the 13-year old turbine for the first time since it came here. The total cost of repairs for the whole works was £447 in 1904, and £441 in 1905, which shows that the turbines take a very small share of the whole. One of the 500 kilowatt sets, which has now been running for five years, has only cost, if we except new rubber valves for the air and circulating pumps, the sum of 7s. 6d. during the whole of that period, being for three steel keys to the worm-wheel, whence the reciprocating motion for the air and circulating pumps is obtained.

With regard to economy in steam consumption, the various tests, which have been published from time to time, show that the turbine, when condensing, has as low a steam consumption as any other type of engine, and in the very large sizes is considerably more economical than any other kind of

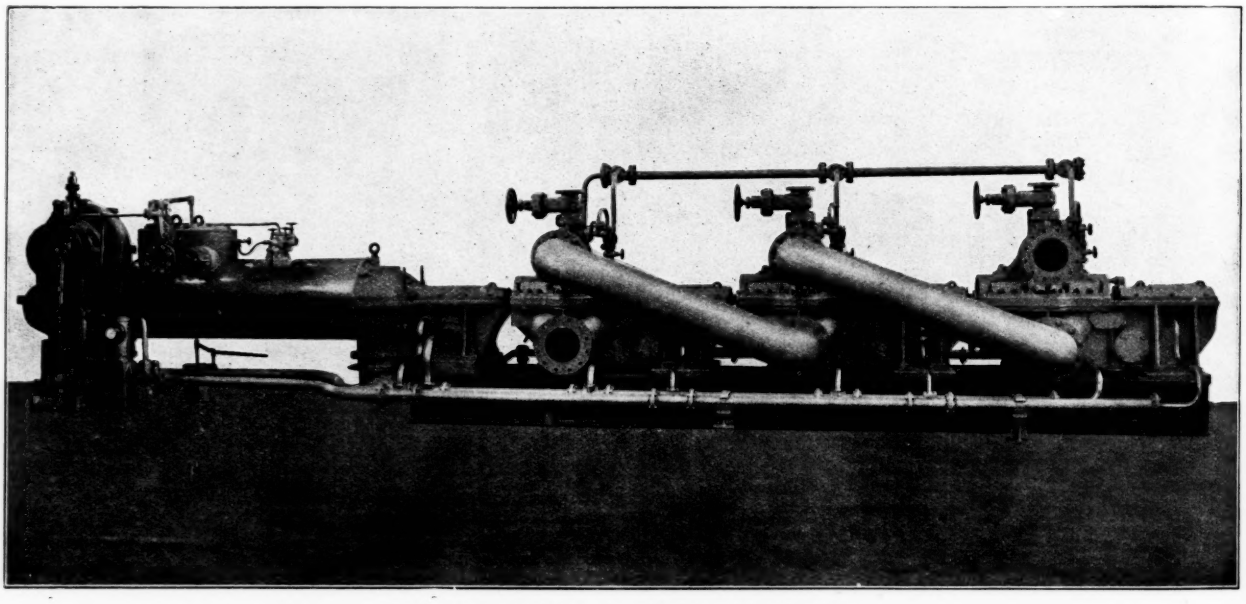


Fig. 3.—The Parsons Turbine applied to Pumping Water.

steam-engine. Further, its efficiency at various fractions of the full load is higher than that of any other type of steam-engine—a great consideration when there are varying loads to be dealt with; and, moreover, the original efficiency does not lessen as the turbine grows older, owing to there being no wearing away of the blades by the action of the steam.

To get the best results from the turbine, a good vacuum is essential, as every inch after 23 inches gives a saving in steam consumption of about 4 per cent. in the 500 kilowatt size—that being the size of the two largest plants used here. Given a suitable condenser and a good supply of circulating water, there is no difficulty in obtaining a good vacuum in the turbine, as there are only the two small steam-packed glands before mentioned where leakage could possibly occur; and even if a leak did occur there, it would be steam that would get in, and not air. At these works an excellent vacuum is maintained; the lowest being 27 inches in the jet condenser set, while those fitted with surface condensers usually give about 1½ inches more than this.

Another advantage, which is most important in dealing with a public electricity supply, is the ease with which a turbine can be set at work with full load in case of emergency. It does not want such careful warming up as an ordinary engine; and if there is any priming, there is no other effect than a slight loss of speed for a few moments until the water is got rid of by the air-pump. The author has run up a machine from standing cold to about three-quarter load in just under a minute and a half.

Although, as previously stated, it was for electrical purposes that the turbine was first used and developed, it has been successfully used for a variety of other purposes—viz., the propulsion of ships, air and gas compressing, blowing, and pumping. Of these, of course, it is in the marine world that the Parsons turbine has developed most rapidly; for since the year 1898 (when the Marine Company started) up to October, 1905, marine turbines of a total capacity of 800,000 I.H.P. have been constructed.

No doubt, the adaptation of the turbine which will be of most interest to those present, is that for pumping purposes; and the following description of the pumping plant illustrated in fig. 3, and the results of tests of the plant will perhaps warrant the presentation of this paper to your Association. This plant was one of two made for the Department of Public Works of New South Wales, and was so arranged that, for temporary purposes, the three pumps could be coupled "in parallel" to make it capable of pumping 4½ million gallons daily, against a head of 240 feet; and for permanent purposes, the pumps could be worked "in series," pumping 1½ million gallons per day against a head of 720 feet. The turbine was of the ordinary 250 kilowatt condensing type directly coupled to three high-speed centrifugal pumps, each designed to deliver 1½ million gallons per diem against a head of 240 feet when running at 3300 revolutions per minute. These pumps were coupled tandem-wise to the turbine; the turbine shaft and the pump shafts all being independent, and each mounted on a pair of

bearings. These shafts were coupled to each other by claw-shaped flexible couplings; the pump-shafts and the runners being interchangeable. Each pump consisted of a 12-inch diameter central double-sided runner revolving in a close fitting casing. At either side of the runner was a pair of small propellers to help the flow into the central runner. Glands were fitted to the shaft to prevent any leakage either of air inwards or water outwards, and end-play was prevented by a thrust-bearing. No packing was used in the glands, which were of the ring-and-groove pattern. The inlet pipe was 11 inches in diameter, and the outlet 10 inches. The pump body was made in two halves, so as to give easy access to the pump shaft and runners, which can be replaced by spares in a very short space of time. The bearings were arranged with forced lubrication as already described. The test was made by condensing and measuring the steam used. The pumped water was measured twice over to prevent mistakes; and to secure the desired head, the water was throttled through a 6-inch sluice-valve after leaving the pump. The head and quantity of water was found to be very steady, and the steam consumption less than that guaranteed by the makers. The Engineer of the Public Works Department reported the result of this test as follows: With steam pressure of only 57 lbs. per square inch, the steam consumption was equivalent to 27·9 lbs. per pump-horse-power per hour; the efficiency of the complete plant being 56 per cent.

The second set of pumps for the New South Wales Government had also to perform a double duty—viz., to pump either 3½ million gallons per day against a head of 240 feet or 10 million gallons per day against a head of 80 feet,

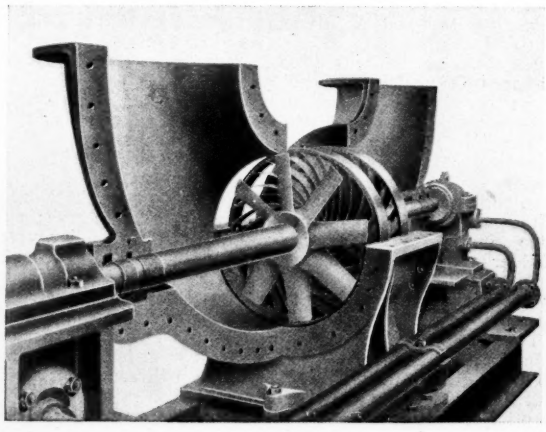


Fig. 4.—The Propeller and Guide-Vanes applied to Pumping Air.

according as the pumps were coupled "in series" or "in parallel." The pumps in this case ran at a speed of 2400 R.P.M., and the moving parts consisted simply of a number of screw propellers arranged in series upon the shaft with suitable guide vanes placed in rings between each pair of propellers; the construction being in fact very similar to that of the turbo exhauster, of which fig. 4 is an internal view. The illustration shows the propeller and guide vanes as constructed for pumping air, but gives a good idea of the internal appearance of the pumps for Sydney. The extreme simplicity of design will appeal to those who are accustomed to the ordinary type of pumping-engine.

It was reported in a recent issue of the "Engineer," that the city of Toronto were adopting a turbine pumping system for their high-pressure fire supply. The plant, which is to supply water at a pressure of 300 lbs. per square inch, will comprise two turbine pumps having a capacity of about 5 millions gallons per diem.

Discussion.

The PRESIDENT said the thanks of the members were due to Mr. Holden for this paper, and for having one of the turbines open for their inspection at the electricity works. It occurred to him (the President) that, when in the present day they were hearing of the extension of high-lift turbines, it would be possible to bring the two together, and make one complete pump of the turbine engine and the high-lift turbine pumps. He had spoken on this subject to several engineers during the last twelve months; but they would never come to the point of connecting the two. The velocity of the turbine was the stumbling-block. It had been done; but the efficiency was rather low compared with the pumps water engineers liked to use at their works. But there were occasions when the two might be usefully combined; and the economy would not be so important.

Mr. C. L. SIMPSON (London) said the steam-turbine was so well known, and so universally adopted, that he would not deal with that part of the paper; but he would like to draw attention to the steam-turbine direct-driven, high-lift centrifugal plant, recently installed by the Public Works Department of New South Wales. In the paper, the over-all efficiency was given as 56 per cent., the steam consumption as 27·9 lbs. per pump-horse-power per hour, which was equivalent on a 10 to 1 evaporation basis to 79 million foot-pounds per hundredweight of best Welsh coal. The design of high-lift centrifugal pumps had recently received a great deal of attention; and with carefully proportioned high-lift centrifugal pumps to do this same service, the results should be as follows: The over-all efficiency should be from 65 per cent. to 70 per cent., which was equivalent to 24 to 22·3 lbs. of steam per pump-horse-power per hour, basing on the same turbine steam consumption as above, or 92 to 100 million foot-pounds per hundredweight of best Welsh coal, showing a difference of from 14 to 20 per cent. less steam consumption; so that, in the case given in the paper, the low efficiency was against the economical working of the steam-turbine and high-lift centrifugal pump combination. At the present time, his firm were building a number of low-lift and high-lift Worthington centrifugal pumps; and it was only by very careful design and their experience that a good efficiency could be obtained from a high-lift centrifugal pump. To compare this case further with a refined type of pumping-engine—either a triple expansion, fly-wheel pumping-engine, or a Worthington high-duty pumping-engine, capable of working on the most economical lines—they would get the following comparison: I.H.P. to P.H.P. 90 per cent. steam consumption per P.H.P. per hour 12½ lbs., which was equivalent to 178 million foot-pounds per hundredweight of best Welsh coal, on a 10 to 1 evaporation basis. When water engineers were considering additions to their works, they had to carefully consider the point as to whether the most expensive engine would not be the best for their service, where constant and reliable working must be the chief aim of the new plant which was to be installed. However, in cases where work was intermittent, and electricity available at a reasonable price, the high-lift centrifugal pump often fitted in very well. Great care, however, must be taken in giving precise data and a description of the exact conditions under which the plant with a high-lift centrifugal pump must work. On this would depend the successful running and working of the plant where the high-lift centrifugal pump was installed. The case given in the paper was a very interesting one.

Mr. F. W. HODSON (Loughborough), having acknowledged the indebtedness of the members to Mr. Holden, said that he had no doubt the members had all heard that these turbines were liable to grave difficulties. But it spoke well for the professional capacity of Mr. Holden and his management of the electricity works at Scarborough, that, with a number of turbines aggregating something like 2600-horse power, the repairs only cost £87, £48, and some other small sum during the past three years. This showed, at any rate, that, though these machines might be liable to defects, they could, in the hands of a skilled man, be kept in a condition which was highly satisfactory. He had always understood that a grave risk was that if, in the length of the bearings, there was a wearing away of only $\frac{1}{16}$ inch, and the end-thrust was very heavy, the blades began to rub against one another; and, as they were all fixed in one groove, in the case of one going, all went. If they touched in the slightest degree, there were 10,000 parts for a man to set to work on, and practically build a new machine. Turbines were particularly used for electrical purposes; and they were being employed more and more for this purpose. As water engineers, they were interested in them from the pumping point of view; and they were pleased to have the particulars that Mr. Holden had given in his paper as to their application to pumping. However, it seemed to him (Mr. Hodson) that the engineer who tackled these turbines for pumping would be taking upon himself some risk as to whether they were suitable for pumping from the point of view of water engineers, with a heavy load, as against other types of pumping machinery. Air-lift pumps, aqua-thrusters, and machinery

of that sort, although not economical, had some other advantages which made them extremely valuable when applied under the proper conditions; and it would probably be found in the future that turbine-driven pumps would be found useful to the water engineer when applied under the particular conditions suited to them.

Mr. H. Ashton Hill (South Staffordshire Water-Works Company) remarked that the matter of pumping by the steam-turbine was one on which he had bestowed some little consideration. The example in the paper was one that was given at the Engineering Conference in London some two or three years ago; and the matter was then discussed. It would perhaps be useful for members to refer to the discussion. One question he (Mr. Ashton Hill) asked at the conference, in regard to this particular plant for New South Wales, was as to whether it would not be better to put down some cheap temporary pumps for the temporary work, and instal high-duty pumping machinery for the permanent work. This probably had nothing to do with the question of steam-turbines for the ordinary purposes of pumping. But when he had occasion to look into the question of establishing pumping plant recently, he did consider whether he should adopt a high-lift centrifugal pump worked by a steam-turbine. But, as far as he remembered, at the moment there was a difficulty in getting a satisfactory steam-turbine of the horse-power which was usual for pumping purposes. It must be remembered that pumping-engines were not ordinarily of a horse power exceeding 500—in fact, they were probably more often of 100 or 200, or even less horse power. Therefore he thought this fact considerably limited the use of the steam-turbine. He felt he had not the courage to start an installation such as he spoke of. But he did this: He considered all the available powers—the Deisel oil-engine, suction gas, Mond gas, and other powers; and he eventually decided to put down a high-speed engine such as was used in electric light stations—a Bellis and Morcom engine—and a high-lift centrifugal pump for forcing purposes. The capacity of the plant was 4 million gallons, lifting 170 feet; and he felt that, although there were only one or two of these plants at work, he should be on tolerably safe lines in adopting it. The plant was now being constructed, and the engine-house prepared for it. Perhaps at some future time, he should be able to tell the members something more about it.

The President remarked that he was very pleased to hear what Mr. Ashton Hill had said, that he was already making a start in the matter of adopting at any rate turbines of the high-lift description. This was really what he (the President) had been thinking of in asking Mr. Holden for a paper, that it would bring the matter before water engineers. Someone must make a start in adopting this form of plant. The small foundations required for these machines was one point in favour of their adoption where they could be used. Possibly some of the engine builders who were members of the Association would be able to design pumps which would be more efficient. He himself believed that the turbine was efficient; and that the loss of efficiency was in the pumps. When they overcame this, as Mr. Simpson said they were doing, he (the President) did not think it would be very long before they heard of installations of this kind of plant.

Mr. Holden, in reply, thanked the members for the kind way in which they had received his paper. The efficiency of the turbine was about 95 per cent.; so that the members would see where the loss of efficiency of the full plant came in. It was in the pump-end; and the pump was where the engineer should tackle the matter. With regard to the question of repairs mentioned by one speaker, he did not think as much skilled attention was required for turbines as for steam-engines. They ran with very little trouble, and did not require looking after as did some of the bigger engines of the reciprocating type. The turbines at tke Scarborough electricity station were only opened once a year—a sort of annual spring clean; and very seldom anything was found the matter with them. Regarding the blades, it was not a fact, as a previous speaker stated, that if one went the lot went. They had occasionally found a single blade missing, and often every trace of it disappeared altogether. (Laughter.)

The Manchester District Institution of Gas Engineers are to have an excursion to Ilkley (to which ladies are invited), on Saturday, the 25th inst. The members will visit the gas-works in the morning; and in the afternoon the party will drive to Bolton Woods and the Strid.

USE OF LARGE GAS-ENGINES.

At the Institution of Civil Engineers, on the 24th ult., a joint meeting of the Iron and Steel Institute and the American Institute of Mining Engineers was opened, under the presidency of Mr. R. A. Hadfield. The proceedings have a certain interest for our readers, as the programme contained two papers dealing with the use of large gas-engines. One was by Herr Reinhardt, of Dortmund, on "The Application of Large Gas-Engines in the German Iron and Steel Industries;" and the other by Mr. Tom Westgarth, of Middlesbrough, on "Large Gas-Engines Built in Great Britain." The following are the principal points in the two communications.

The paper by Herr Reinhardt was a rather voluminous one, extending to 106 pages, and having numerous diagrams and 15 folding plates. The author began by stating that the idea of burning blast-furnace gases directly in gas-engines instead of under steam-boilers was first put into practice barely ten years ago—almost simultaneously in Great Britain, Germany, and Belgium; and the pioneers of the movement made their first experiments with small engines. He then proceeded to review the extent of the application of gas-engines in iron-works and collieries in Germany; the working results, including the influence of purification on the gases, as well as the present practice in the design of large gas-engines in Germany. In order to arrive at conclusions as correct and as complete as possible, the managers of iron-works and collieries possessing gas-engines were invited to answer a series of questions, and the manufacturers of gas-engines to supply detail drawings. In answer to these inquiries, it was ascertained that of the 49 German smelting-works questioned, 32 had already gas-engines at work, and nine had ordered some. There are at work or in contemplation 349 engines, with a total effective horse power of about 385,000, 64 of which have a power of about 34,000, and are of older construction, with single-acting four-cycle motors, 88 of about 91,000, with two-cycle motors, and 197 of about 260,000, with double-acting four-cycle motors. The author also gave details of engines ordered between March 1 and July 1 this year for various purposes by German iron-works and collieries, which altogether number 411, with an aggregate power of 457,300. The largest aggregate power of gas-engines at any single works amounts to 35,000 effective horse power; 16 works possess over 10,000-horse power; and 27 works possess over 5000-horse power in actual working. In most iron-works the whole of the gas-engines work continuously without any reserve; a few have up to 40 per cent. reserve, and a few have a similar reserve of older types of steam-engines or steam-turbines. So far as the author is aware, at the beginning of last March, 16 collieries had 35 gas-engines at work, in course of erection, or on order. The aggregate of all the engines was 33,300 effective horse power.

The author passed on to consider the practical experience gained by working. He said that from what had been learned up to the present time, it was clear that a thorough purification and drying of the gas was undoubtedly the principal factor in assuring a continuous and undisturbed working of gas-engines. German manufacturers had from the very first considered the cleaning of the gas as an essential condition; while, on the other hand, the Cockerill Company regarded it as unnecessary. He added some remarks upon the purification of coke-oven gas for utilization in gas-engines, and gave some results of the influence of purification.

Proceeding to describe the present design of large gas-engines in Germany, the author remarked that from the answers received from the iron-works and collieries it might be concluded that the old arrangement of the single-acting four-cycle motor, with one or more cylinders, had in recent years not been generally used, and that, on the other hand, double-acting four-cycle motors, mostly with tandem cylinders, were in keen competition with two-cycle motors. The rest of the paper was devoted to two-cycle engines on the Oechelhaeuser and the Körting systems; and in conclusion, the author stated that the present position of the application of gas-engines in German iron-works showed the value the managers of these undertakings attributed to the better and less dangerous utilization of the waste gases of their furnaces, and the successful efforts that had been made by the German engineers to meet the requirements suddenly demanded by iron-works.

Mr. Westgarth's paper was a much shorter one; the author confining himself to showing what has been done in this country with the larger sizes of gas-engines. He remarked that in England gas-engines had come into use for a good many purposes. It was at first thought that they were so troublesome and ill-adapted for general purposes that they were not of much service; but it would be seen, from the schedules attached to the paper, that they were in use for dynamo driving, blowing, and rolling-mill work, tube-rolling, air-compressing, cement and paper mills, and even for cotton-mills. Therefore he did not think that it needed any argument to show that the gas-engine had "come to stay," and that it was doing a great variety of very useful work. The primary object of these engines was to use gases which had been wasted, but which had suddenly attained great value because of the way in which they could be utilized with advantage. In addition to blast-furnace gases, coke-oven gas and various kinds of producer gas—even that made from bituminous

coal—had been employed for gas-engines of large size. In the schedules referred to, the author gave the number of large engines of various makes now in use. The particulars may be summarized as follows (the total indicated horse power being given in parentheses): Oechelhaeuser, 28 (32,600); Körting type, 6 (4875); Premier type, 28 (16,950); Willans and Robinson, 2 (1800); Crossley Bros., 33 (19,360), and the Cockerill type, 22 (20,500). Mr. Westgarth pointed out that the names of several well-known firms had been omitted because they had not as yet built engines of 500-horse power and upwards, though they were all producing engines of fair size. To illustrate the extent to which large gas-engines are now being used in Great Britain, the author attached to his paper several photographic reproductions of some of the principal illustrations.

Mr. Westgarth closed his paper with a few remarks on cleaning the gas to be used in engines. He said most engineers commenced this operation by passing the gas through ordinary fans with water. It was soon found that two or more fans in series would really be necessary, and that a considerable quantity of water and much power were required—the result not always being satisfactory, particularly if the gas had not previously been very well cleaned and cooled by passing through large dust-catchers and long mains. A difficulty also occurred with the moisture absorbed by the gas in the fans; and it had been found necessary to supplement the fans by various cleaning and drying devices. He said one of the pioneers in dealing with the cleaning of gas for engines was Mr. B. H. Thwaite, whose apparatus was illustrated, as well as several others.

In the course of the remarks to which the papers gave rise, Mr. E. J. Duff, of Liverpool, said he had set to work to utilize the surplus gases after the coke-ovens had been fired, and had decided to adopt gas-engines to employ the gas to drive dynamos in conjunction with electric furnaces for the production of calcium carbide. That had worked extremely well from the commencement; and they calculated that they had enough gas to produce 500-horse power. But when about seven years ago he applied to various makers to build gas-engines of this power, none of them would do so. Very little scrubbing was required for this gas; and the only alteration he found necessary, after starting to run the engines, was the insertion of a little box of oxide of iron to take out a trace of sulphur and cyanide. No reference had been made, so far as he was aware, to a very important installation of gas power which had been set to work at Madrid. The plant was his own design, and the engines were of the Nuremberg pattern of 2000-horse power. There were six engines, with a total capacity of 12,000-horse power. One of them had made a record run, practically for six months, and there was no trouble with tar. Mr. James Hamilton (of Coatbridge) remarked that British gas-engines had not developed along quite the same lines as the German ones. These had been designed chiefly with a view to raising the maximum power, and not so much with the object of increasing the economy; but the English engines had been developed rather in the latter direction. Mr. A. T. Tannett-Walker, of Leeds, pointed out that it was not the Germans but the English who were pioneers of the gas-engine. He gave all credit to the Germans for largely developing it; but the British were the originators, and they must take the credit for it.

THE MANUFACTURE OF LIGHT.

Our readers are aware that the British Association for the Advancement of Science has been meeting this year in York; and on Saturday, the 4th inst., the usual popular lecture was delivered by Professor Silvanus Thompson, who discoursed on the above subject before a crowded audience.

The lecturer began by emphasizing the fact that, with the exception of the vacuum tube or the vapour lamp, the evolution of light had been the result of incandescence, or the shining of bodies because they were hot. One of the scientific problems of the day was to find a sort of lamp that would give light without heat. All sources of artificial light were deplorably wasteful. They burnt up a lot of gas or oil, or used up an electric current, and wasted the greater part of it in emitting heat rays that were not wanted, and utilized very little of it in generating the light rays that were needed. After dealing with the solid particles in incandescence, and showing that the brightness of the flame was due to them, he came to what he described as an exceedingly important point. He said any ordinary solid body, when heated hot enough to become incandescent, would give a spectrum showing all the colours from red to violet in a continuous band. All ordinary solids yielded, when they shone, a continuous spectrum; but there were some substances which, when heated to incandescence, gave out a spectrum of a different kind, consisting not of all the colours but of only a few particular ones. These substances were, for the most part, not solids.

Professor Thompson went on to show that the production of good light depends upon getting the right kind of rays, and also the best emitters. He said the waste of our methods of producing light lay in the fact that so many rays are produced which are not visible. By no process of pure incandescence could we realize the ideal case of getting light without heat. Nature did not work that way; and the American fire-fly was a case in point. It emitted no measurable amount of dark heat, but sent out radiations only within the limits of the visible spectrum. If only we could expend the energy of our gas, oil, or electricity as economically as the fire-fly expended its energy, we ought, according to Professor Thompson, to get for the same expenditure 400 times as much light as we did in fact now get. Clearly, the glow-worm and the fire-fly manufactured their light by some quite different process from our crude and inefficient methods. They certainly did not work by incandescence.

Were there, however, he asked, any other bodies which showed any special power of emitting rays of luminous quality? Well, it had long been known—was known even in Tyndall's time—that certain rare earths exhibited when incandescent a remarkable spectrum, different from that of ordinary solids; and to the application of this knowledge was due the introduction of the Welsbach mantle, the special merit of which was that it raised to incandescence these rare earths. Without making allowance for the cost of the mantles, this incandescent light was theoretically not more than one-sixth the expense of gas burnt in the old-fashioned way; and by burning the gas under pressure, as was now often done in street illumination, the cost could be still further reduced. There had lately been introduced the "Millennium" gas-light, several improved electric glow lamps, using osmium, tantalum, zirconium, and tungsten for the filaments; further improved arc lamps were being made, and the British Cooper-Hewitt electric mercury vapour lamp was a remarkable production.

Professor Thompson exhibited these various forms of lights, and gave a table showing their relative theoretic efficiencies and their drawbacks, from which the following figures are taken:—

	Candle Hours for 2s.	Poison, Cubic Inches Carbonic Acid.
Gas (batswing)	2,720	536
Paraffin light	7,895	366
Welsbach mantle	12,500	72·5
"Millennium" light	25,494	39·0
Glow lamp	3,745	—
Osmium lamp	7,143	—
Nernst lamp	5,882	—
Arc lamp	10,000	2·2
Flame arc	47,619	0·8

He dealt largely with comparisons of costs and light values as between gas and electricity, and said he gave his own and Professor Wedding's tables to show that they agreed. All were of opinion that enormous strides had been made in recent years in both of the most important methods of illumination. Gas illumination which cost 1s. to produce a few years ago, was now produced by compression at less than 1d.; and, so far as public lighting was concerned, the same might be said of electricity—for the flame arc was wonderfully cheap. He expected some great developments during the next fifteen years.

After showing the various methods of electric lighting, Professor Thompson said he was fortunately in a position to show the meeting what was really the last word in gas illumination. Mr. Blakey had fitted up certain plant which would demonstrate the charts and figures which had been shown, and prove how great had been the advance he had talked of. On a 10-light rail in front of the audience there were then shown a flat-flame burner, a Welsbach-Kern burner, and a new inverted gas-lamp. Duplicate incandescent lamps (with ordinary low-pressure gas-burners) had air driven into them by means of a hydraulic pump, to show the increased value of light which could be secured by this means. Then a series of lights of from 500 to 1300 candle power were shown with the gas under a pressure of 54 inches. The gas was compressed in an electrically driven "Colonia" machine, governed without a gas-bag, a water-tank, or springs. The experiments were very loudly applauded.

Professor Thompson added that none of the machinery on view had been seen in England before; and he had been asked not to make any public statement about the small engine. He might say this, however, that he had seen it in Mr. Blakey's laboratory, and it had solved the difficulty of giving small units of light by means of high-pressure gas or compressed air. This was not its only advantage. It would cost less to make this wonderfully ingenious machine than to pay the carriage on an ordinary compressing plant from London to York.

The lecturer concluded by saying that we in Great Britain spend annually a gigantic sum—estimated at from £10,000,000 to £20,000,000—in manufacturing for ourselves such artificial lights as our civilization demands, and 99 per cent. at least of this colossal sum is thrown away on mere heat. He predicted a great future for the man who would invent a practicable luminescence lamp giving light without heat.

A cordial vote of thanks was passed to Professor Thompson, who, in reply, said it would have been impossible for him to perform his experiments had it not been for the whole-hearted enthusiasm of his assistant, Mr. Taylor, and of Mr. Blakey, who had given a great deal of time to making the lecture interesting. The officials of the York Gas and Electric Light Companies also deserved thanks for their courtesy and assistance.

We are pleased to learn that Mr. William King, of Liverpool, who has lately returned to England after a visit to Italy, has been placed on the Commission of the Peace for the County Palatine of Lancaster.

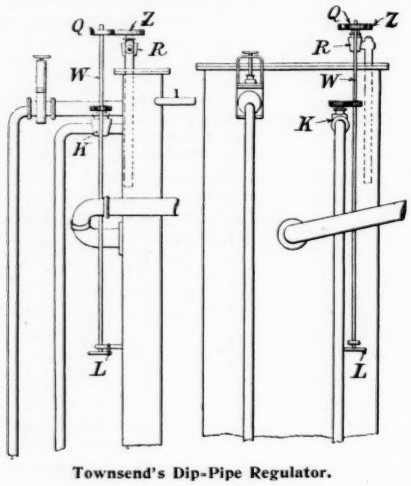
REGISTER OF PATENTS.

Regulating the Seal on Retort Dip-Pipes.

TOWNSEND, H., of Wakefield.

No. 14,369; July 12, 1905.

This invention relates to the apparatus described in patent No. 25,050 of 1904, in which the seal can be removed from, and restored to, the dip-pipes of gas-retorts by means of a valve operated by a hand-wheel. In this case, the hand-wheel also actuates the cock controlling the supply of liquor from the overhead tank, so that by one movement of the wheel the valve is opened and the cock closed—thus removing the seal from the dip-pipes; and by a movement in the reverse direction the valve is shut and the cock is opened so as to restore the seal.



Townsend's Dip-Pipe Regulator.

The hand-wheel L, as in the 1904 patent, is used to open and close the valve K; but according to the present invention, it also actuates the cock R, through the shaft W and gear wheels Q Z, so that by one movement of the hand-wheel the valve K is opened and the cock R closed—thus removing the seal from the dip-pipes; and by a movement in the reverse direction the valve K is shut and the cock R is opened to restore the seal.

Manufacture of Coal Gas and Producer Gas.

PARRY, J., and PILLINGER, H. J., of Newport, Mon.

No. 15,226; July 25, 1905.

This invention relates to a continuous process for the manufacture of coal gas and producer or carbonic oxide gas, by using a coal-gas retort disposed in the producer-gas generator, and having tuyeres or means for admitting a blast at its lower part, and delivering through the tuyeres a pressure blast of hot or cold air unmixed with steam.

In carrying out the invention, the coal-gas retorts are arranged in a heating furnace which somewhat resembles in construction a blast-furnace for smelting iron ore in the manufacture of pig-iron. In the furnace, the retorts, charged with coal and lime, are subject to the heat of burning coke, the combustion of which is maintained by the forced blast (either hot or cold) introduced through the tuyeres. The gas given off from the coal in the retorts is conducted therefrom; and, after having been treated in the usual way for the recovery of bye-products, it is available for use for illumination, warming, cooking, &c. The coke which is removed from the retorts is, after the gas has been taken off, carried up to the top of the furnace and, while hot, charged into the body thereof, and used as fuel therein. The carbonic oxide gas produced from the fuel in the body of the furnace is led off through pipes near the top of the furnace, and is available for use for heating boilers, driving gas-engines, and for other purposes for which producer gas is suited.

Fig. 1 illustrates in vertical section a furnace suitable for gas production in accordance with this invention. Fig. 2 is a vertical section taken at right angles to fig. 1—the retorts being transverse in this arrangement. In fig. 3, the retort is vertical.

In figs. 1 and 2, retorts A extend across and through the walls of the furnace, and are fitted with end covers and with pipes for conducting off the gas as generated. The pipes (not shown) may be of the ordinary kind fitted with couplings or connections for attachment to the retorts, and with cocks or valves for controlling the outlet of gas as produced. The retorts are preferably disposed at an inclination to facilitate clearing the coke out of them, after the generation and withdrawal of the gas generated from the coal with which they are charged.

The furnace is charged with coal or coke, and when at full red heat, the retorts are charged with coal and lime (the latter for fluxing the ash of the coal) and then closed—the furnace being also properly charged to maintain a continuous red heat. Blast (either hot or cold) is introduced through the tuyeres B. After sufficient time has elapsed for the generation of gas to the full extent in the retorts, the gas is withdrawn and led off in pipes; and, after having been treated in the usual way for the recovery of tar, ammoniacal water, and other bye-products, it is available for use. The resulting coke is rammed out into a tram or other receptacle C, in which it is taken up, by winding gear D, to the furnace top, where it is charged, while still hot, into the furnace. "The cheapest kinds of coal can be used in the retorts, as all the combustible matter contained in the coal is utilized—no portion of the organic residue being wasted." The carbonic oxide or producer gas given off by the fuel in the furnace is drawn off through pipes E, and is available for use in heating boilers, driving gas-engines, and for other purposes for which such gas is suitable. The carbonic oxide gas produced in the furnace is "given off retaining its full richness and its full degree of combustibility."

The fluid slag or ash is withdrawn from the furnace from time to time through the apertures F, which are, of course, plugged up during manufacturing operations.

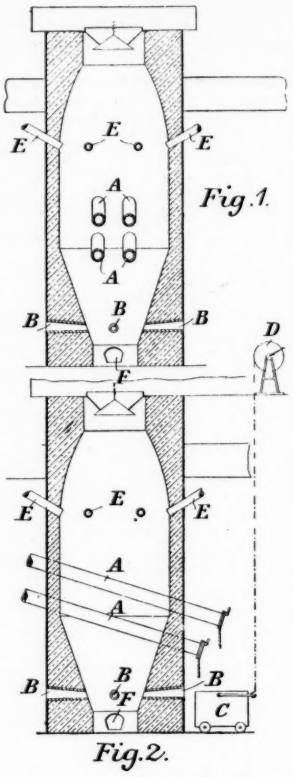


Fig. 1.

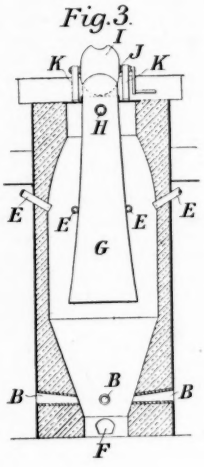


Fig. 3.

Fig. 2.

Parry and Pillinger's Gas Plant.

The retort G in the arrangement shown in fig. 3 is vertical, and open at the lower end. The coal is charged into the retort, and the supply of fuel in the furnace for heating the retort is derived from the retort, the coke from which moves down automatically from the retort into the body of the furnace. The gas produced in the retort is drawn off by the pipe H. The coal for feeding the retort is run in by a charging vessel I, mounted on a spindle J, supported in bearings in standards K. This vessel, which is adapted to be rotated, fits the mouth of the retort G sufficiently closely to prevent any escape between it and the retort of the gas generated in the retort. As in figs. 1 and 2, the carbonic oxide or producer gas is led off from the furnace by the pipes E.

Treating Gases from Dry Distillation of Fuel.

KOPPERS, H., of Essen-Ruhr, Germany.

No. 16,386; Aug. 11, 1905.

This invention has for its object to obtain the bye-products contained in the gases of the dry distillation or gasification of fuels—that is to say, the whole of the tar and ammonia contained in the raw material—in a more simple and less costly manner than hitherto, and without the admixture of decomposed organic substances, and at the same time to render harmless by dilution the waste liquors. The invention is characterized mainly by the fact that the separation of these products from the gas mixture takes place at the temperature "most appropriate for obtaining them in the desired marketable condition, and also that the waste waters are discharged into the atmosphere in a highly diluted form of vapour." The invention likewise comprises the separate treatment of the salt solution which is formed by the precipitation of the ammonia already absorbed by the acid in the raw gas.

The method of procedure adopted is normally as follows: The raw gas is greatly cooled, in some cases far below its dew or condensation point, when, of course, the quantity of water corresponding to the final temperature, which has hitherto been held in suspension, is deposited. It is cooled (say) to a temperature of from 40° to 45° Celsius (whereby a quantity of water is deposited which is 1·5 times the remaining quantity of gas), and is then conducted through a tar-separator in which the tar that has not yet been deposited is separated almost completely. The temperature of the gas so purified is then raised to such an extent that it is superheated in accordance with the water that it contains. This is best effected by employing it as a cooling medium in one of the coolers for the raw gas coming from the furnace, whereby the excess heat of this latter gas is indirectly transferred to the former. The gas freed from tar may then be washed with acid in known appliances, thereby forming a strong lye, as, owing to the superheating of the gases, no dilution takes place as a result of the deposit of water.

During the cooling of the gases, there is deposited with the decrease

of temperature a certain quantity of water, which contains approximately half of the total ammonia. A part of this ammonia (say, 10 per cent. of the total amount) is precipitated in the form of a salt solution, as it has already been combined with acids (sulphuric acid, hydrochloric acid) in the raw gas. This quantity of water containing ammonia is then subjected to further treatment separately—for example, being driven off with lime and steam in a distillation column of any known kind. The waste vapours, which carry off with them the total amount of the ammonia previously contained in the water, and which are at approximately 100° C., enter a saturation vessel, which is filled with the lye produced in the process of washing the gases referred to above. It is in this bath that the salt is deposited.

In principle, the formation of the ammoniacal salt from the ammonia of the vapours and the sulphuric acid of the bath takes place at any temperature. Fixed solid marketable ammonia (which is the desired final product) is, however, only formed when the vapours passing through are superheated—that is to say, when no condensation, but on the contrary a further vaporization, is effected upon entering the bath. The height of this temperature, or the percentage of water, is ascertainable from the consideration that ammonium sulphate decomposes in neutral solution at temperatures close on 100° Celsius. The lower the temperature in the saturation bath, the less is the danger of small quantities of salt being volatilized from the salt solution. As the waste vapours form a superheated mixture, the formation of the fixed sulphate takes place with certainty in the saturation bath with acid sulphate lye, which is itself preferably maintained at an appropriate temperature of about 80° Celsius, so as to avoid any condensation.

The waste waters of the distillation apparatus invariably contain dissolved tar constituents, especially phenols, and cannot be purified by chemical means. But, in accordance with the process described, by avoiding the introduction of large quantities of fresh water in the process of obtaining the bye-products, the quantity of these waste materials has already been considerably restricted, as the quantity of liquid remaining over is composed of the moisture contained in the coal (14 per cent. of the charge) and of water chemically formed in the distillation (6 per cent. of the charge).

In accordance with the present process, these waste products are discharged for suitable dilution into the other medium which is available—that is to say, into the atmosphere—by supplying the waste waters of the distillation apparatus, after clarification, to the combustion gases in the chimney (in a very finely divided state) so as to vaporize and conduct them into the atmosphere.

In addition to the waste heat of the combustion gases passing off, other quantities of heat, which are liberated in coking processes, but which are never or seldom used, may likewise be employed in this vaporization. Thus, for example, the heat of the oven lost by radiation and part of the heat contained in the hot combustion gases may be used.

The vapours of the saturation bath, freed from ammonia, pass off in the hot gas coming from the scrubbers, and are cooled with this latter to atmospheric temperature, when for the first time the water vapours are completely deposited; this condensate "forming a pure water fit for use." The gases themselves do not suffer in this process; so that from them benzol, illuminating gas, and the like may be formed as usual.

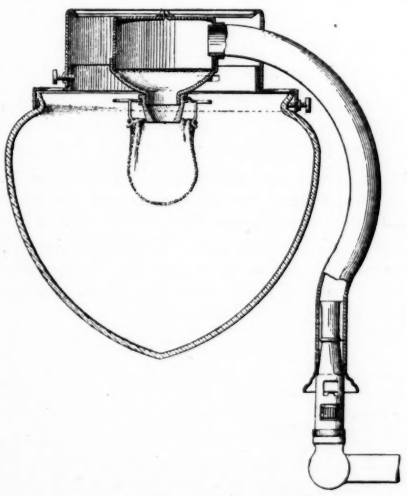
The inventor does not illustrate the apparatus he would employ, but claims: "A process of the kind hereinbefore described for obtaining the bye-products of gases of the dry distillation or gasification of fuels characterized by the driving off of the ammonia contained in the condensation water in a distillation column or similar apparatus, the vapours of which are conducted into a saturation bath which is charged with the lye obtained in the washing of the gases."

Inverted Incandescent Gas-Lamps.

WIEDERHOLD, O., of Jersey City, N.J., U.S.A.

No. 2320; Jan. 30, 1906.

This invention relates to incandescent gas-lamps with inverted mantles in which there is left an annular space between the burner and



Wiederhold's Inverted Gas-Burner.

the edge of the mantle—the burner forming the continuation of a regenerative chamber provided with a gauze diaphragm so as to prevent the mixture of gas and air lighting-back, and wherein the chamber is centrally disposed on an outer casing so as to provide a flue for the escape of the burnt gases, and the casing is fitted with a gallery having ventilating holes—instead of, as heretofore, shrouding the air holes of the mixing-chamber, and arranging the burner above the air holes to prevent back-ignition.

The mantle (as shown) is attached to a plate provided with means for adjustably attaching the mantle to the burner and providing spaces between the burner and edge of the mantle for the escape of the products of combustion from within the mantle. The gas and air inlet tube is attached to the side of the regenerative chamber, so that the greater portion of the length of the tube is unaffected by the heat of the combustion gases, and an outer casing has at its upper end a spider-frame for the attachment of the chamber to it and to provide exit spaces to the flue between the chamber and casing; while to its lower end is attached a gallery ring for carrying a globe, provided with vertically disposed fresh-air ventilating holes.

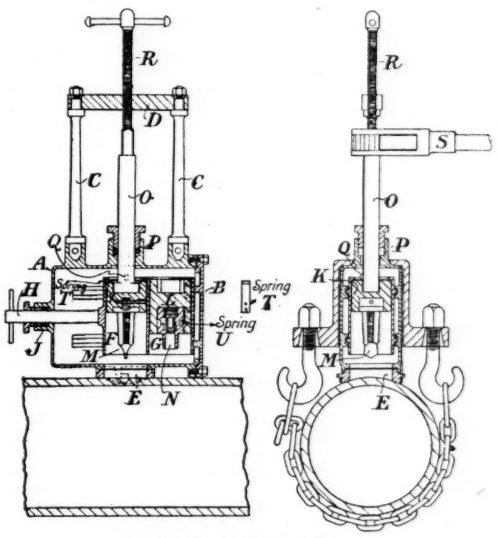
Drilling, Tapping, and Connecting Mains Under Pressure.

BOYD, W., of Brighouse.

No. 2945; Feb. 7, 1906.

The inventor employs a box-shaped casing together with an intermediate or saddle-piece curved to suit the pipe to which it is desired to insert the branch connection or ferrule; the casing being held in position by a chain or band which embraces the pipe—the ends of the chain being provided with screwed bolts and nuts which engage with lugs or flanges attached to the casing; or alternatively the lugs or flanges may be formed in a loose bridge or band of wrought iron supported by, but not attached to, the casing.

The casing A (of gun metal) consists of a casting provided at the end with a cover plate B, and having bosses cast on top for the purpose of supporting wrought iron or steel pillars C and C, which are braced together at the top by the wrought iron or steel crosshead D. The casing A is supported by an intermediate or saddle-piece E curved on the underside to suit the pipe and capable of easy attachment to, or detachment from, the casing by means of two lugs working in bayonet lug joints. A holder, consisting of two barrels F G with an extension spindle H (all cast in one piece), is enclosed in the casing and arranged



Boyd's Pipe Driller and Tapper.

to be capable of easily sliding horizontally backwards and forwards inside same—this being accomplished by means of fins or bearers cast on the holder, and which work in grooves correspondingly arranged on the inside of the casing. A stuffing-box J is provided round the spindle to prevent leakage, and the two barrels F and G contain respectively two sockets or cylinders K and L; the former being attached to a combined drill and tap M, and the latter supporting the ferrule N, which is to be inserted in the main—the support for the ferrule being obtained by means of a spring U.

Each socket is recessed to receive the vertical spindle O, and is operated in turn by the spindle. The spindle O is provided with a stuffing-box P, and is also furnished with a feather-key Q working in a groove in the stuffing-box in such a manner that in operation the feather-key does not cease to engage with the groove in the stuffing-box until the spindle end has engaged with either K or L, according to the operation next to be performed.

Each socket is provided with a spring to retain it in position at the top of the barrels F and G until such time as it is to be brought into operation; but the means for retaining the sockets in their respective positions differ in method of construction, as the socket K, attached to the combined drill and tap, is required to travel downwards and then back again to its former position, while the socket L, attached to the ferrule, is only required to travel downwards. Hence the spring T, for supporting the socket K in position, is of such construction that the moment the spring ceases to engage with, and retain, the socket in connection with the barrel F, the spring clamps the socket K to the vertical spindle O, and the spindle will not disengage from the socket until it has returned to its former position at the top of the barrel.

The necessary pressure to release the springs which hold the sockets in position is imparted by the adjustable screw R, which also serves to

give the requisite feed to the drill and tap and (in turn) to start the screwed ferrule into the tapped hole. The requisite revolution to actuate the drill and tap and to screw the ferrule into the tapped hole is imparted to the spindle O by a rachet brace S, which is capable of rotating the spindle in either direction.

In practice, after the hole is drilled and tapped by the combined drill and tap M, and the tap reversed and withdrawn from the tapped hole, the pressure of gas or water now inside the casing A lifts the socket K back to its original position, and the moment the spindle O is withdrawn clear, the pressure of water causes the holder to move horizontally and bring the socket L containing the ferrule into the position formerly occupied by the drill, and thus ready for the second portion of the operation to be performed—*i e*, the insertion of the ferrule in the tapped hole.

Lighting Gas and Dense Coke from Coal Dust.

PISTORIUS, A., of Waldenburg, Silesia.

No. 3870; Feb. 16, 1906.

The inventor's object is to utilize coal dust which "by reason of its composition is adapted for producing lighting gas but by reason of its small cohesive property has hitherto only been able to be employed as mixed coal." This he effects by bringing it into a condition which "not only allows of lighting gas of perfect quality being obtained from the coal dust in the manner customary in gas-works and with the ordinary retorts, but which also yields coke of such density and size of lump that it may be employed for smelting purposes without further treatment."

The process consists in the coal dust being mixed in a dry condition with finely-ground lime and also finely-ground pitch, and the mixture compressed under high pressure into briquettes of dense consistency. The pitch, which is softened by the high pressure, or rather the heat, produced, is thereby caused to act as binding material in the ordinary way. The briquette thus obtained is used for making gas in ordinary gas-works retorts. By briquetting effected under high pressure so thorough a cohesion of the particles of coal is said to be brought about, that their coking during the distillation of the briquetted coal-dust proceeds throughout the briquette, and thus in the gas-retort coke is obtained of the same size of piece as the briquette introduced.

By the addition of lime the sulphur contained in the coal is fixed during the gas making, and thereby the purity of the lighting gas obtained is said to be considerably increased. The addition of lime to the coal employed for making lighting gas is already known; but in this the process has not been carried further than forming, after the manner of brick-making, brick-like pieces or blocks from the mixture of coal and lime and feeding the retorts with them. This method, however, only produces a fixing of the sulphur to a very limited extent, because simply mixing small coal and lime does not produce that thorough contact of coal and lime which the chemical process producing the fixing of the sulphur requires; and, further, this simple mixing operation yields a brittle coke, and has also the drawback that, in drawing the coke, particles of lime are liable fo fall off in the form of dust and endanger the sight of the workmen.

If, on the other hand, the mixture composed of coal dust and fine ground lime according to the present invention be made into strongly compressed briquettes, and in this form distilled in the retorts, it is claimed that all the above drawbacks are removed, as by the formation of the mixture into briquettes, coal and lime come into so intimate a contact, that a thorough fixing of the sulphur is obtained. The process also affords the advantage that, in consequence of the thorough interpenetration or mingling of coal and lime produced by the high briquette pressure, the quantity of the latter added may be considerably diminished—thus increasing the quality of the coke.

The fixing of the sulphur is also said to be advantageous and especially remunerative, "as thereby the obtaining of cyanide by the ordinary methods and also of ammonia is substantially simplified and the quantities increased."

The amount of lime added is regulated according to the sulphur contents of the coal dust employed. The mixture is usually so arranged that to 100 parts by weight of coal dust there are used 3 to 4 parts of lime and 5 to 6 parts of pitch; but these proportions vary according to the peculiar constitution of the coal dust and the various purposes for which the coke is to be employed. If the coal dust to be treated contains impurities, the dross is first removed (say) by washing as far as possible, and the remaining coal is then dried.

APPLICATIONS FOR LETTERS PATENT.

17,141.—WALKER R. G., and WALKER BROS., LTD., "Gas-heated galvanizing bath." July 30.

17,184.—POTTER, W., "Regenerative gas-producers for water and other gases." July 31.

17,214.—THOMPSON, D., "Gas-producing plants for water and other gases." July 31.

17,225.—WILSON, G., "Price-varying mechanism for prepayment meters." July 31.

17,234.—GIBBONS, W. P., and HOYLE, H. P., "Measuring chambers for coal." July 31.

17,240.—HINDEN, A., "Igniting and extinguishing gas-lights from a distance." July 31.

17,258.—GLOVER, T., "Preventing surreptitious tampering with gas-meters." July 31.

17,287.—LUCAS, H., and EGGINTON, W. H., "Acetylene lamps." Aug. 1.

17,288.—SUTHERLAND, A. G., "Prepayment meters." Aug. 1.

17,296.—HIPKINS, W. E., and PENDLEBURY, C., "Gas-producers." Aug. 1.

17,322.—WOODS, J. E. T., "Incandescent mantles." Aug. 1.

17,477.—CHAMBERS, J. D., "Acetylene generator." Aug. 3.

17,589.—ELLIS, H. J., "Securing shades to inverted lamps." Aug. 4.

17,622.—HOOTON, R., and the ASHTON GAS COMPANY, "Producing or enriching gas." Aug. 4.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by Correspondents.]

Herr Korting's Paper on the Vertical Retort.

SIR,—In the discussion upon the above at the Institution meeting, Herr Körting, at the request of the writer, kindly undertook to supply complete analyses of the gas made from Boldon coal at Mariendorf and at Berlin—the latter in horizontal retorts—for purposes of comparison.

On returning from a holiday, I felt it devolved upon me to thank Herr Körting privately and publicly for the figures relating to Mariendorf gas published in your issue of July 17. When making my acknowledgments, I ventured to draw attention to the fact of the absence of figures from Berlin, and ask an explanation of the words "per cwt." appearing at the head of the columns of figures.

It seems the better plan to ask you to publish Herr Körting's reply (herewith enclosed).

Vauxhall, Aug. 11, 1906. A. F. BROWNE.

[ENCLOSURE.]

Berlin, Aug. 6, 1906.

A. F. BROWNE, Esq.

Dear Sir,—In answer to your questions, contained in your favour of the 1st inst., I beg to state that we have not been in a position to make an analysis of the gas made from Boldon coal alone in our horizontal retorts; but we hope in a short time to be able to do so, and I shall then have much pleasure in sending you the figures we find.

With regard to the words "per cwt." at the top of the column in my analysis in the "JOURNAL OF GAS LIGHTING" of the 17th of July, you will no doubt have already found out that this is an evident misprint for "per cent."

Thanking you for your kind remarks.

(Signed) E. KÖRTING.

The Reduction to Prepayment Consumers at Burslem.

SIR,—On p. 390 of the "JOURNAL" for the 7th inst., it is stated, in a paragraph dealing with the reduction in price to prepayment consumers at Burslem, that, on the recommendation of the Gas Committee, "the Burslem Town Council have agreed that from Sept. 30 the discount on gas consumed through automatic slot meters shall be increased *from 2d. to 4d. per 1000 cubic feet* to all consumers in the borough of not less than 1000 cubic feet per quarter." The words italicized should read "from 4d. to 6d. per 1000 cubic feet." The present price is 3s. 4d., less 4d. per 1000 feet; and the proposed reduction will be 3s. 4d. less 6d. I presume your correspondent must have copied from the *agenda*, which was corrected at the Council meeting, and the resolution carried as corrected.

Longport, Aug. 10, 1906. EDWARD JONES.

Prompt Payment of Gas Companies' Dividends.

SIR,—Mr. Corbet Woodall, the Governor of the Gaslight and Coke Company, incidentally mentioned, at their last half-yearly meeting, that he knew of no other Company in London or its proximity which held its meeting as early as the Gaslight and Coke Company. I would venture to say that the Aldershot Gas and Water Company held its meeting on Friday last at 2.30 in the afternoon, and the dividends were paid immediately after the meeting to the shareholders present, and posted to all other shareholders the same evening.

Aldershot, Aug. 8, 1906. R. W. EDWARDS.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Wednesday, Aug. 8.

(*Before Lords Justices* VAUGHAN WILLIAMS, ROMER, *and* COZENS-HARDY.)

Corporation of Manchester v. New Moss Colliery, Limited.

This was an appeal from the decision of Mr. Justice Farwell, dismissing (with costs) the action of the plaintiffs, who sought to restrain the defendant Company from so carrying on their mining operations as to endanger plaintiffs' reservoirs. The case has been fully reported in the "JOURNAL" (see Vol. XCII., pp. 692, 838). Since the hearing, the leading Counsel on either side—Mr. Fletcher Moulton and Mr. Neville—have been raised to the Bench.

Sir ROBERT FINLAY, K.C., Mr. JENKINS, K.C., and Mr. HUGH MOULTON (instructed by Messrs. Austin and Austin, for Mr. W. H. Talbot, of Manchester) represented the appellants; Mr. UPJOHN, K.C., Mr. ROSKILL, K.C., and Mr. MACSWINNEY (instructed by Messrs. Bower, Cotton, and Bower, for Mr. H. G. Hall, of Ashton-under-Lyne) appeared for the respondents.

It will be remembered that on the trial a good deal of evidence was given by mining and hydraulic engineers on questions of fact; but no point arose about these matters on the appeal, which turned entirely on questions of law—the same arguments being repeated as had been put forward in the Court below. Sir Robert Finlay and Mr. Jenkins contended that the plaintiffs possessed, in respect of certain land which they had purchased from one Taylor, the common-law right to lateral support from adjoining land; while, on the other hand, Mr. Upjohn

and Mr. Roskill submitted that the Water-Works Clauses Act contained a code of law applicable to all water companies or bodies empowered to carry out water-works undertakings, which took the place of their rights at common law, and in some respects limited them. The arguments extended over two days, and at the conclusion judgment was reserved. This was delivered to-day.

Lord Justice VAUGHAN WILLIAMS said that, since writing his judgment, he had had the advantage of reading the judgment of Lord Justice Cozens-Hardy, and he so entirely agreed with it, and the expression of all that need be said, that he should not have delivered his own judgment had it not been that they were differing from the judgment of Mr. Justice Farwell; and he therefore thought it right to deal with the grounds of that judgment as far as he could. His Lordship then proceeded to read his judgment, stating the grounds on which he thought the appeal should be allowed.

Lord Justice ROMER said he also had had an opportunity of reading the judgment of Lord Justice Cozens-Hardy, and he need only say that he agreed with it,

Lord Justice COZENS-HARDY then delivered judgment. He said the appeal raised many important questions, which might, he thought, be shortly stated. The Manchester Corporation, in January, 1875, purchased from the Earl of Stamford and Warrington an estate of 246 acres; and, in the conveyance, the mines and minerals were especially reserved to the Earl, with full power to work all or any of the minerals without making compensation. In July, 1875, an adjacent estate of 23 acres was purchased from Taylor. This conveyance expressly included the minerals thereunder. At the date of the conveyance, the Corporation had no compulsory powers to purchase the property; but under the Water-Works Act of 1847 they had authority to purchase by agreement. In 1875, the Corporation obtained another Act, which incorporated the Water-Works Clauses Act and the Lands Clauses Consolidation Act. A large reservoir had been constructed, partly on the land purchased from Lord Stamford and Taylor, and partly on other adjoining land; but it was sufficient to say that a part of the northern embankment was on Taylor's land. The New Moss Colliery, Limited, were lessees of coal under Lord Stamford, including the coal under the reservoir. In 1899 and in 1903, they gave to the Corporation notice of their intention to work certain mines adjacent to or under the reservoir, and no counter-notice was given by the Corporation. The defendants worked the coal under the Stamford lease, with the result of withdrawing lateral support from Taylor's land, and causing a serious subsidence to part of it. It was proved before Mr. Justice Farwell that this subsidence was caused by mineral working partly within and partly beyond the limit of 40 yards from the reservoir; and, further, that the subsidence would have taken place to an equal extent if the water-works had not been there. But there was no suggestion that the mines were worked in an unusual manner. Under these circumstances, it could not be disputed that the Corporation, as owners of Taylor's land, had at common law a right of action against the defendants, unless such rights had been taken away by reason of the provisions of the Act of 1875 and the Acts incorporated therewith. He would assume, without deciding it, that the provisions of sections 18 to 27 of the Water-Works Clauses Act, 1847, applied, notwithstanding that at the date of the conveyances from Lord Stamford and Taylor, the Corporation had no compulsory powers. An argument to the contrary might be raised by reason of section 6; but for the present purpose he would assume this point in favour of the defendants. It would be convenient to consider the case, first, as to workings within the prescribed distance of 40 yards; and, secondly, as to the workings beyond this limit. As to the first, section 22 imposed on mine-owners the obligation of giving notice 30 days before approaching the prescribed limit, which in this case was 40 yards; and the option was given to the undertakers to pay compensation and prevent the working of minerals within the distance named. If, however, the undertakers did not within 30 days state their willingness to treat for compensation, section 23 provided that it should be lawful for the owners to work the mines, and drain the same by means of engines, as if that Act and the Special Act had not been passed, so that no wilful damage was done to the works, and the mines were not worked in an unusual manner. In this case no counter-notice was given; and section 23 came into operation. The parties were then remitted to their common-law rights—the Corporation, on the one hand, not being entitled to any protection in respect of the greater weight imposed on the land by reason of their reservoir and works; and the mine-owners, on the other, not being at liberty to do anything which would at common law have been an actionable nuisance. It seemed to him to follow that the Corporation, in the events which had happened, had retained their right, in respect of Taylor's land, to claim damages for the subsidence caused by the working of the mines within the limit of 40 yards. As to the second question, with respect to damage caused by working beyond the 40 yards, no protection seemed to be given to the undertakers in any event. The mine-owners were under no obligation to give statutory notice under section 22; and the undertakers had no power to stop any such workings by means of a counter-notice. He could see no reason why a mine-owner should not be liable to the undertakers in respect of the damage caused to Taylor's land. In short, it appeared to him that sections 18 to 27 of the Act had no application. But in the result he thought there was no necessity to distinguish, if it were possible to do so, between damages occasioned within and beyond the limit of 40 yards. Mr. Justice Farwell seemed to have considered that, except so far as protection was conferred by sections 18 to 27, no claim of any kind could be made by the undertakers against the mine-owners; but, with great respect to the learned Judge, he was unable to assent to this view. Section 23 appeared to him to leave the parties to their common-law rights in the events which had happened; and he shrank from holding that anything which had been done deprived the Corporation of the right which they admittedly had at common law with respect to Taylor's land. He did not think it was necessary to discuss the various authorities to which attention had been called by Counsel in arguing the case. It was sufficient to say that, in his opinion, there was no authority inconsistent with the view he had taken. It followed that the appeal ought to be allowed, and an injunction granted, with an inquiry as to damages. But the order should be without prejudice to the rights, if any, that the defendants sought to assert by their counter-claim.

Lord Justice ROMER added that, of course, care would have to be taken, in framing the injunction, to show that the only tort committed was interfering with lateral support to the land in its natural state.

Mr. JENKINS said, with regard to the costs, they were ordered to pay the costs of the action and of the counter-claim. He supposed this would now be reversed.

Lord Justice ROMER said he thought they need say nothing about the costs of the counter-claim; the matter was not worth talking about. The order as to costs in the Court below would be discharged, and the appellants would get the costs of the appeal and the costs of the action.

Mr. UPJOHN asked if their Lordships would grant a stay of the injunction.

Lord Justice ROMER said he thought the balance of convenience was the other way. He should have thought they ought to stop at once letting down the reservoir. This was a very serious thing.

Sir ROBERT FINLAY remarked that the consequences might be very grave.

Lord Justice ROMER said no case arose for stopping the order.

Sir ROBERT FINLAY said there were certain other lands taken under the same circumstances as Taylor's land; but he apprehended there would be no difficulty in the junior counsel settling the terms of the injunction.

Mr. UPJOHN said, as he understood it, their Lordships' decision went to all cases where the plaintiffs had purchased the common-law right to adjacent support.

Lord Justice COZENS-HARDY: Certainly.

Mr. UPJOHN said the arrangement below was that the junior counsel should examine the deeds, and see in what cases that right existed.

Mr. JENKINS said the inquiry as to damages would, they supposed, be in respect of the subsidences that had already occurred.

Lord Justice ROMER: The subsidences caused by the tort; it would be the ordinary inquiry as to damages.

MANCHESTER COUNTY COURT.—Wednesday, Aug. 8.

(*Before Judge* PARRY)

Action against the Economic Gas Company, Limited.*

This was an action brought by Samuel Walkey Gillett, of Disley and Manchester, to recover £98 12s. damages from the Economic Gas Company, Limited, of London, owing to the failure of their alleged automatic lighting apparatus to supply light for household purposes.

Mr. ACTON appeared for the plaintiff; and Mr. EWART represented the defendant Company.

The case for the plaintiff was as follows: In the spring of 1904, he was erecting two semi-detached villas at Disley, Cheshire, and he placed an order with the defendant Company for two sets of apparatus for the two houses, at £40 each. The apparatus was alleged to work automatically, and to supply a light equal to 1000-candle power at a cost of 1d. per hour. When fixed, and in working order, the plaintiff found that the apparatus was practically a failure so far as working automatically was concerned. Lights went out unexpectedly; there was a hissing noise; and an unpleasant odour from the pipes. Moreover, the cost, instead of being less than gas, was much more expensive—in fact, it was prohibitive. The number of mantles used was great. Complaints were made from time to time; and the defendants sent men to readjust the apparatus and make alterations. But still the thing did not work satisfactorily, and the defendants then put in a second improved plant. The shed in which this was fixed was not properly ventilated. It had no window in it. Plaintiff found the second plant as great a failure as the first. He did not deny that, with a skilled person in regular attendance at the machine, it would work all right; but his chief allegation was that it did not work automatically. After the lights were turned on, they would burn for one or two hours and then go out. If an extra burner was lighted, others would go out. Sometimes there would be a good light in one part of the house and a bad one in another part. He finally got disgusted with the whole thing, and told defendants to take it away. It was affected by changes of temperature, and soon went wrong. The defendants had alleged in a pamphlet that the light supplied by it was cheaper by over 60 per cent. than any other system of lighting. Petrol cost him 8d. per gallon. He had used 169 mantles. It would require gas at 10s. 7d. per 1000 cubic feet to compete with the machine he had obtained from the defendants.

In cross-examination, plaintiff admitted that he had suggested he should be allowed a commission on new orders for the apparatus within a radius of 7 miles of Disley; but at that time he expected it would be a success.

Mr. *Walter Scott*, a solicitor, submitted the results of tests made (in October and November) of the quantity of petrol used. It required a gallon per night. Petrol cost 10d. per gallon. He had to go out to readjust the apparatus twice per night. He had used 169 mantles and 108 gallons of petrol. Compared with ordinary gas, he put the cost at 10s. 6d. per 1000 cubic feet.

Cross-examined by Mr. EWART, witness said when the defendants' men came and tested the second machine, it was true that they said the engine had been over-oiled. They did use a less quantity of petrol than he had done; and the lights were all right that night.

Mr. *E. E. Adams*, agent for the defendant Company, said he had tried defendants' apparatus, and it turned out a complete *fiasco*.

Mr. *G. E. Fletcher*, a civil engineer, said the defendants' machines were not automatic nor self-adjusting. The expense was greater than the same amount of light by ordinary gas would be.

* The Company here referred to, it is well to point out, is not the Economical Gas Apparatus Construction Company—the owners of the Merrifield-Westcott-Pearson patents for carburetted water-gas apparatus.—ED. J.G.L.

Mr. EWART said, before calling any evidence—should it be necessary to do so—he submitted, on the point of law, that the plaintiff was not entitled to recover.

After the legal arguments,

His HONOUR held that the representations of the defendants on the sale of the apparatus amounted to a warranty.

Mr. EWART then called witnesses.

Mr. *C. K. Fowler*, the Manager of the Company, and an inventor of parts of the machine, explained its mechanism. He considered "automatic" a proper title. At the works in London they had one of the machines working night and day. When he went to examine plaintiffs' plant, the engine was so very dirty that it would not revolve. There was a lot of green stuff in the carburettor. It seemed to him plaintiff had been burning pure petrol air without any atmospheric air at all. No skilled attendant was required. They had 60 other machines at work. Mr. Scott admitted that the light was "splendid."

Dr. *Samuel Rideal* said he had tested various gas-producers. He went to see the plaintiff's machine and that of Mr. Scott. Improper oil had been used. He tested the apparatus with old petrol. After cleaning the machiney, it worked all right. He was half-an-hour putting the machinery right; but only a minute in starting the engine. The estimate of a pint of petrol per 100-candle power per hour was a very fair one. The machines were properly made; but when he saw them the chains had been removed, and the automatic portions thereby disconnected. He had been to the defendants' works at Romford and found other machines of like manufacture in good working order. He considered that the plaintiff and Mr. Scott had not properly instructed their maids in the manipulation of the apparatus.

His HONOUR, in giving judgment, said he found from the evidence that the plaintiff's machines and Mr. Scott's machine did not fulfil the promise made for them by the defendants at the time the contract was made. After referring to the various claims made by the defendants as to the excellencies and powers of the apparatus, he said it was clear that, up to the end of 1905, the defendant Company were experimenting with their machines. They would not do what was claimed for them. There was strong evidence that they had succeeded in some instances, and he was ready to admit that it was a wonderful machine; but in the case of the plaintiff, and also with respect to the one obtained by Mr. Scott, it had not worked automatically. It required attention; it consumed more petrol than had been represented as necessary; and it cost more than gas or electricity. There would be judgment for the plaintiff for £75 and costs; the defendants to have the machines back. The defendants also would have the money paid into Court by the plaintiff on the counterclaim.

THE ALLEGED OVERCHARGE FOR GAS AT UDDINGSTON.

Further proceedings have taken place in the action by Mr. John Turner, writer, of Camphill, Uddingston, against the Bothwell and Uddingston Gas Company, Limited. The action, it may be remembered, related to an alleged overcharge by the Company and the circumstances of it were fully set forth in the "JOURNAL" for May 22 (p. 524). As reported there, Sheriff-Substitute Thomson, in the Hamilton Sheriff Court, dismissed the action, and found the Company entitled to expenses. Against this decision, Mr. Turner appealed to the Sheriff-Principal, in Glasgow. Sheriff Guthrie has affirmed the decision of his Substitute, with further expenses to the Company. In his opinion, Sheriff-Substitute Thomson's reasons were quite unanswerable. He was disposed to doubt the competency of the appeal under section 42 of the Gas-Works Clauses Act, 1871; but his attention had been directed to the fact that the Railway Clauses Act, 1845, had been incorporated with the Special Act, and that section 150 of that Act allowed an appeal. It was not clear that this prevailed over section 20 of the Act of 1871; but as he was of the same opinion as Sheriff Thomson, the question of competency was of no present practical importance.

This action was preceded by an application by Mr. Turner for interdict against the enforcement of a demand note to pay for gas consumed, and interference with the gas meter and fittings in his house. Interim interdict was granted; but, on an undertaking being given by the Company not to cut off the gas supply, it was recalled. The action having been decided on its merits, parties were subsequently heard in the Hamilton Sheriff Court upon the question of the expenses in the application for interdict.

Mr. TURNER contended that the practice of the Courts was not to allow defenders in interdict actions to ride roughshod over their opponents, who had a *bonâ-fide* ground for raising the action, whether or not they might afterwards be successful. He held such to be the case here, and pointed out that it was only at adjustment, when his Lordship refused interdict, that the defenders' agent intimated that the cut-off notice would not be enforced. As pursuer, he having raised the action *bonâ fide* to protect himself against highly oppressive measures, threatened by the defenders, the latter were not entitled to expenses, or, at the very least, expenses should not be awarded to either party.

Sheriff THOMSON said a gas company were empowered to cut off the supply, and in so doing they were only making use of a rather summary measure provided them by the Legislature. The expenses were by no means imposed as a punishment, but as a recompense to the successful party. While it was true a *bonâ-fide* action arose here, he thought the expenses must be reckoned as ordinary expenses *in causâ*.

Mr. TURNER submitted that the Company should not have applied the *compulsitor* of the Act when a *bonâ-fide* question was to be raised and settled.

The SHERIFF: They were working the Act within their legal rights.

Mr. TURNER said the pursuer also was working within his legal rights in asking the Court to protect him from what he considered to be the oppressive measures of the Company.

The SHERIFF: And I quite recognized that by granting you interim interdict.

Mr. TURNER: They were not dealing with a person with an empty house, which was the circumstance the Legislature had in view in granting them this power. In this case there was any amount of visible assets to cover their claim; and they had the ordinary civil remedy of raising an action in the Small Debt Court, but failed to do so. They shirked that, and said, "No, we will cut you off." The Company did not act *bonâ fide* in this, because these cut-off notices were not sent to all concerned, but only to some half-dozen consumers. The agent for the Company admitted that it was never intended to put the notices into force. Why then were they served, if not maliciously?

The SHERIFF said he was clear on the matter. Mr. Turner had been unsuccessful in the principal application in which expenses had been given against him; and there being nothing left in the interdict action, the expenses of it must also be given against him.

Mr. Turner has lodged an appeal to the Sheriff-Principal against this decision.

Incandescent Lighting Litigation.

In the King's Bench Division of the High Court of Justice last Wednesday, before Mr. Justice A. T. Lawrence, Mr. Sinclair moved for judgment in default of appearance in an action brought by the Anti-Vibration Incandescent Lighting Company, Limited, against T. Haines, Limited, to restrain infringement of letters patent of which the plaintiffs are owners. Counsel said the validity of the patent had already been upheld by the Court in a previous case; and he applied for an injunction to restrain the defendants, their servants and agents, from infringing the patent, an inquiry as to damages, for delivery up of the infringing articles, and for costs as between solicitor and client. He also asked the Court to certify that the particulars of breaches were reasonable and proper. His Lordship made the order in the terms asked.

A Coal and Iron Company as Gas and Water Suppliers.

In the Chancery Division of the High Court of Justice last Tuesday, Mr. Justice Swinfen Eady had before him a petition by the Wigan Coal and Iron Company, Limited, for the sanction of the Court to an alteration in their Memorandum and Articles of Association. Mr. Eve, K.C., and Mr. MacSwinney appeared in support of the petition. It was stated that the Company was incorporated in 1865, and had been most successful; the profits over the last four years averaging £70,000 a year. They had acquired mines at Nottingham, from which they were pumping large quantities of excellent water, which they wished to sell to a Local Authority. They also desired to produce and sell gas, electricity, and coke, and make use of the bye-products. The only substantial additions to the old Memorandum would be the power to build and own ships and supply electricity and water for domestic purposes. His Lordship sanctioned the proposed alteration.

Theft of Gas in Aberdeen.

In the Aberdeen Police Court, on Friday last, before Bailie Booth, John Gray, labourer, residing at 55, Esslemont Avenue, and his wife, were charged with having, between the 2nd of April and the 4th inst., fraudulently abstracted and consumed a quantity of gas belonging to the Town Council. Mrs. Gray was not present, and a warrant for her arrest was issued. Gray pleaded guilty, and made no explanation. The prosecutor stated that Gray had been a consumer of gas prior to the 19th of March. On that date, owing to his not having paid an account amounting to £3 12s. 8d. for gas supplied, the gas was cut off; but the meter was left till the 12th of July, to give accused an opportunity of settling. The account was not paid, and subsequently the meter was removed and the end of the supply-pipe sealed. On Saturday, the 4th inst., an inspector found the gas burning in a gas-ring upon the grate; the supply being obtained by a metallic pipe from a bracket at the fireplace. Going to where the meter used to be, he found a piece of rubber tubing, with a stop-catch attached, connecting the service-pipe with that which supplied the house. The Magistrate said the offence was a very serious one. The accused knew perfectly well that he was doing wrong. It was a deliberate theft; and the penalty would be a fine of 20s., with 18s. 6d. expenses, or ten days' imprisonment.

Fire at the Milan Exhibition.—Early on the morning of the 3rd inst., a fire, believed to have been caused by the fusion of electric light wires, broke out in the buildings of the Milan Exhibition. The Decorative Art Sections of Great Britain, Germany, Switzerland, the Netherlands, Japan, Persia, Turkey, and China were saved; but the Italian and Hungarian Sections were destroyed, as was also a pavilion of the Italian Architecture Section. The damage is estimated at about £160,000.

Shanklin Water Supply.—In connection with the water supply at Shanklin, the Local Government Board have sanctioned the employment by the District Council of Professor Robinson, who has already paid a visit to Chillerton, and made a report which is highly favourable to the Council's efforts to secure this source. Professor Robinson states that the volume of water obtainable is abundant; and he is confident that it will suffice, not only for the present maximum demands of the summer months, but will provide a large margin for any future extension of Shanklin. He bears testimony to the skill displayed by the Council's Surveyor in the preparation of the plans.

New Joint-Stock Companies.—The United Gas and Water Association, Limited, has been registered with a capital of £5000, in £5 shares, with the object indicated by the title. The National Air-Gas Company, Limited, has been registered with a capital of £25,125 (25,000 of £1 preference and 2500 of 1s. ordinary shares), to adopt an agreement with Mr. T. H. Glasscoe. The U.C. Mantle Company, Limited, has been registered with a capital of £2000, in £1 shares, to take over the business of a manufacturer of, and dealer in, incandescent gas-mantles carried on by Mr. F. W. Cleveland, at No. 8, South Street, Finsbury, E.C., as Messrs. Cleveland and Co. There will be no initial public issue.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held last Wednesday, at the City Terminus Hotel, Cannon Street, E.C. —Sir GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Frank Bush) read the notice convening the meeting and also the minutes of the last ordinary and extraordinary meetings; and the seal of the Company having been affixed to the register of proprietors (the number was stated to be 14,665), the report and accounts were taken as read.

The CHAIRMAN: Ladies and gentlemen, I am very pleased, and so are my colleagues, to see so good a meeting at this time of year. It is now my duty to move the adoption of the report. The motion will be: "That the report and accounts now presented be received and adopted, and the report entered on the minutes." I regard a Company of this sort—a joint-stock company—as a democracy; and providing that honesty and intelligence govern its proceedings, I do not know that there can be a much better form of government than a democracy. Acting on this principle, your Directors have always endeavoured to give in their report the utmost possible information to the shareholders, because they feel that the property belongs to the shareholders, and that they are entitled to know its position at all times. It is not, therefore, necessary to go into much detail.

THE POSITION OF THE COMPANY—THE DIVIDEND.

The report and accounts are very full. The first three or four paragraphs tell the position of the Company, which shortly is this: Two years ago, in 1904, we reduced the price of gas to 2s. per 1000 cubic feet, and from that time up to the end of last year we had not been able to earn sufficient to pay the dividend we have paid—not quite, but a considerable balance carried forward has sufficed to make up the deficiency. It was over £50,000; but after the last dividend was paid it was reduced to £5000. The fact is simply this, that at 2s. per 1000 feet we could not earn sufficient to pay the dividend to which we are entitled. The dividend that has been paid has been 5½ per cent.; and we are entitled to £5 14s. 8d. We should have paid, had we earned it, £5 13s. 4d. We go by sixths, because such amounts as 3s 4d., 6s. 8d., 10s., 13s. 4d., and 16s. 8d. divide into equal pennies on all quantities of stock.

THE PRICE OF GAS.

You will say, perhaps, "Why did you reduce the price to 2s. two years ago?" Well, we did not expect there would be a considerable drop in the value of coke immediately; but I think if two years ago we could have foreseen exactly what was going to happen, we should still have reduced the price to the 2s. And remember that if we had kept it at 2s. 1d. you would not have been able to have more than the 5½ per cent. We should have been entitled to £5 12s., but we could not divide the odd 2s. Therefore, if we had kept the price at 2s. 1d., the dividend would have been the same as now; but we should have accumulated a very large surplus—something like £150,000. I think we did right in reducing the price when we did. The policy of the Company has always been to consider the interests of the consumers first and foremost. Perhaps some will say "That is not right; you are there to look after the interests of the shareholders, and they ought to come first." Well, I think the policy of considering the consumers has tended to the benefit of the shareholders. I am perfectly certain that the purely selfish policy which some people advocate, and some people pursue in the conduct of their affairs, is a mistake. It is just as wrong in the case of companies as it is in the case of individuals. In endeavouring to do the best for our consumers, we have made them our friends. Then there was another reason. At 2s. per 1000 cubic feet, ordinary gas can compete with producer gas and suction gas. There are people who want us to supply our gas for power purposes at prices equivalent to that of suction gas. Well, at 2s. per 1000, we are practically doing it, because this suction gas or producer gas has only about one-fourth of the heating power of coal gas. The consequence is that coal gas at 2s. per 1000 cubic feet is equivalent to the other gas at 6d.; and then they have all the trouble of it. This Company do not go upon the principle of making fish of one and fowl of another. It is a practice with some gas companies and gas corporations supplying gas to charge to the consumer using it for light the full price; and when using it for power, they charge 25 or more per cent. less, which seems to us to be quite unfair. Well, the position is simply this: We have now earned sufficient to pay 5½ per cent., but not sufficient to pay £5 13s. 4d., and we have to pay for our coal what will amount to about £60,000 more in the year. Under these circumstances, the Directors have not thought it well to increase the dividend beyond the 5½ per cent. The amount of profit was sufficient to have paid more; but instead of paying a higher dividend we thought it right in the first place to reduce the monazite sand suspense account, and the £9000 which has been written off that would otherwise have gone into the profit.

THE PRICE OF COAL.

One paragraph in the report deals with price of coal, which has advanced somewhat. All I have to say about it is that I hope gas companies will not agree to any preposterous demands of the coal-owners. It has happened three times previously that a slight rise of coal in one year, of about 1s. per ton, has been followed next year by an enormous rise. This happened in 1872-3, in 1890-1, and again in 1900-1. Now in 1906 there is a rise of about 1s. a ton. But let us do all we can at any rate to prevent any outrageous advance that the coal-owners may be tempted to try on next year.

THE VALUE OF TAR—A SUGGESTION.

There is a reference in the report to the receipts from tar and ammonia. It is about this tar question I wish to speak more particularly; and I am speaking, I trust, to a larger audience than that which is in this room. It is a very serious matter for the gas companies of England that tar is so low in value. Its value is little more than—in fact, it is about the same as—it was before all the wonderful discoveries were made. It has been very tantalizing to hear so much about the coal tar colour jubilee just now. Dr. Perkin is worthy of all honour—not merely as an eminent scientist, but as a man. The man's character is one that we must all admire and respect; but there the jubilee business ends. A jubilee is a time of rejoicing; but as far as England is concerned it might well be a time for putting on sackcloth and ashes, rather than for rejoicing; for the enormous benefits that should have been derived from tar are absolutely lost to us. The discoveries were made in England, and the manufacture began in England; and tar advanced very largely in value. This Company were selling tar at a little over 1d. per gallon—perhaps 1½d.—in 1870; and in a year or two we were selling it at 3⅛d. a gallon—an advance of quite 2d. When I tell you that 1d. per gallon on the tar is equivalent to 1d. per 1000 feet on the gas, and that 1d. per 1000 feet on our gas is equal to £52,000 a year, you will see that, if we were getting proper value for our tar, we should be able to sell gas at certainly 2d. per 1000 feet cheaper. The English manufacturers let the tar colour trade go after large fortunes were made. The patent expired about 1873; and then the trade went to the Germans, which is stated to be something like £20,000,000 a year; and we are only getting the fuel value of tar, simply because we gas people are "a rope of sand." We make tar, we distil it, we sell the crude products for just what they choose to give us, because they have been able to accumulate a stock which will last them five years. The consequence is that anthracene, which at one time was sold at £140 per ton, now realizes hardly £5. They simply say, "We do not want it." What I have to suggest is that the English gas companies and corporations making gas should dispose of their tar as far as possible for other purposes—sell it to county and borough authorities for road making. Some gas companies are already working in this direction. Some however are trying to get as high a price as they can from the road makers. Now, is not this a mistaken policy? The right policy would be to sell it for road making at the price at which it is sold to the contractors, and then a very large quantity would be taken. The roads of England would be vastly improved; and the remainder of the tar would have a chance of realizing its proper value. Then it is also valuable as fuel. One of the companies with which I am connected are selling part of their tar to be burned in locomotives; and they get the same price for this tar as they are getting from the distillers. If the gas industry would but act together—if we had a Rhodes or a Beit connected with the gas industry, to do for tar what they did for diamonds—we might get something like the value of our tar products, instead of letting them go away for prices such as we get.

MONAZITE SAND.

The next paragraph I wish to draw your attention to is the one about the monazite sand. We tell you that we have written off £9000 from the monazite sand suspense account. This sand is the raw material from which mantles are made. A rare earth known at thorium is extracted from it, and the substance of the mantles consists to the extent of 99 per cent. of thorium and 1 per cent. of cerium, which is also obtained from the sand. Now, the position was this: Here, again, England was nowhere. The monazite sand was in two hands. It was sold under agreement to a Convention who made the thorium; and the owners of the monazite were under agreement not to sell it to anyone else. The consequence was that thorium, which is absolutely essential for the mantle, was a complete monopoly, and we were in this precarious position, that at any moment the price might be raised to an unlimited extent, and mantles, which we had induced our customers to adopt very largely, and which we adapted to all the public lamps in the Company's district, might have become unobtainable from the price being too high. Well, your Directors did not like to be in that position, and they determined to do everything in their power to put themselves in a place of safety and security. We heard of a property in America where monazite sand was to be found. We bought it, and put up machinery for working it and obtaining the sand. The last reports are that we are in full work now; and we find we can obtain the sand at a price which will enable us to produce thorium at a figure that will give mantles at a cheap rate. Whether it was our doing this, or whether it was because an English firm of chemical manufacturers put up plant and started the manufacture of thorium, but at the beginning of this year the German Convention reduced the price of thorium about one-half—from 53s. to 27s. per kilo. What their object was in doing this, we do not know; but we feel perfectly certain that it was not in order to help the gas industry; but rather to secure and maintain their monopoly. They wished to prevent the manufacture of thorium anywhere else or by any other parties than themselves; and they thought if they reduced the price to one-half, other manufacturers would have to give up. The result of their reducing the price has been to place us in a position of very great security. We now see our way—in fact, we have practically got a supply of thorium (partly from them at a low price, partly from our own property, and partly from another source), which will satisfy all the requirements of the Company for a great many years; so that we are really in a very safe position as regards the supply of thorium for our own purposes. It has cost us a considerable amount of money. We have spent £29,000 on the monazite business; and if we had known it would have cost £30,000, I say deliberately it would have been a wise thing to place ourselves beyond the possibility of injury from the monopoly. We have written off £9000 of the sum. We had hoped, if the price of thorium had remained at what it was, the profit to be obtained from the thorium from our own property would have wiped off the £25,000 or £30,000, as I daresay we may do in course of time. We do not like suspense accounts; and having £9000 to spare, we wrote it off the last half year. I do not know whether the shareholders approve of this, but they have not suffered in dividend, and we have gained in security; for, so far as this Company are concerned, there is no possibility of any interference with the supply of mantles at a cheap rate.

CO-PARTNERSHIP AGAIN.

My next and last reference will be to the paragraph about the co-partnership. The Directors think it well to draw the attention of the shareholders from time to time—in fact, we do it every half year—to the large sum that is credited to the employees of all ranks under what we call the co-partnership system. It amounts to £43,961; being at the rate of 9¾ per cent. on salaries and wages. Now, ladies and gentlemen, you will ask—and you have a right to ask—"Is that good business? We are paying the full current rate for salaries and wages, and, in addition, we are giving this 9¾ per cent. What are we getting from it?" We are endeavouring to impress upon all employees that they must earn this money. It is not philanthropy, but it is business, and the money must be earned. We think it is earned. It is one of those things which it is very difficult to prove, to show how and where this £44,000 a year is saved by improved working. But we fully believe it is saved, and there are other advantages resulting from it as far as the men are concerned. There is no question whatever that their position is greatly improved. They are raised from a position of dependence to one of independence. They are shareholders and are in a vastly different position from what they were before this system was introduced. There is no doubt whatever that when a man is raised in the social position, and when he has practised thrift to the extent indicated, the necessary self-denial and self-control he exercises must tell on his character; and we are satisfied that the workmen are better in every respect than they would be if this system were not in force. But we gain in other ways. For instance, we are perfectly secure against the possibility of a strike. The strike seventeen years ago cost the Company well over £100,000. Some may say: "Well, you had better have a strike once in ten years, and spend £100,000 upon it, than give £40,000 a year to prevent it." Well, I do not agree.

THE TRADES DISPUTES BILL.

In the first place, the £40,000 is earned, we believe; but, if it is not, to be absolutely secure from the possibility of a strike—the possibility of interference with our business—is a great thing. I maintain that it ought not to be possible for any outside body to interfere in any way with the supply of such a necessity as gas to the public, and especially now, when the Trades Disputes Bill has just passed the House of Commons. Trades Unions have no power to interfere with us, and make no attempt to do so, but now they are to be given authority to "peacefully and reasonably persuade" men not to work where and how they like. We know what "peacefully and reasonably" means. We know perfectly well that picketing means intimidation, and nothing else. There is no necessity for an Act of Parliament to authorize people to peacefully and reasonably do anything, if that were all. The number of pickets is not to be limited. They are to be free to put any number of pickets they please into the streets round a man's house and round the doors of the factory where he works; and what will be the result if this law passes? Parliament will have given strikers freedom to do as they please practically. Employers must have equal freedom. In the United States there is a body known as "Pinkerton's Police"—a body of armed men who are engaged for the protection of men who wish to work in the face of a strike. A Mr. Pinkerton organized this body; and when a strike is started, the employers engage a number of Pinkerton's Police to picket the pickets. That is a perfectly fair thing, if the Government of the country say that the pickets are to be free to do what they like.

FEELING OF SECURITY.

Well, it does not matter to us. I do not think that there is any possibility of any Trade Unions or any organization of this kind interfering in our work. Our men are too far and too deeply interested in the Company to allow any interference of that sort; and this is the great benefit we derive from the co-partnership business. But the greatest benefit of all is that we are benefiting our workmen. The duties of employers do not end when they pay their men their wages. We are placed in a position of great influence; and if we will but use this influence for the benefit of the people who are depending for their living on our work, we are only doing what is our duty and what is right. (Hear, hear.) I am very glad to hear that response. There is too much of the feeling that the man gives so much time and the employer gives so much money, and that is the only relation between them. That is a wrong line. What is wanted is that, instead of employers and employed being driven apart as the Trade Unions tend to separate them, they should be brought together and made partners; and if we can help our employees to improve their position in life, I hold—and I may say the Board are quite with me—it is our bounden duty to do all we can to help them. That is all we are doing. I have great pleasure in moving the adoption of the report.

Mr. EWART seconded the motion.

A SHAREHOLDER asked as to the amount of interest paid on employees' deposits.

The CHAIRMAN: Half their bonus is invested in stock. The other half is on deposit with the Company; and the interest we pay on that is 3 per cent. But the bonus itself is dependent on the price of gas; and it amounts at the present time to 9¾ per cent. on the salaries and wages.

The resolution was then adopted.

DIVIDEND RESOLUTION.

The DEPUTY-CHAIRMAN (Mr. John Mews): It is now my pleasure to propose a resolution with regard to the dividend. I think you will all agree with me that it is a very great thing to have stability of dividend. We have given you 5½ per cent. now for some little time. It is also important for us that we should have stability in the value of our stock, which I think also has been to some extent carried out. Although other securities have greatly gone down lately, gas stocks hold their own most remarkably; and this leads me to make this suggestion, that, as the avenues for the promoters of companies are getting rather restricted—and you know promoters of companies never go to sleep—it may perhaps strike them that the gas industry may be a splendid opportunity for them to exercise their ingenuity upon. There have been during the last five or six months instances of no less than four proposed new gas companies which were offering shares to the public. But I am happy to think that the suggestions that were made in the prospectuses were so clumsy that the whole thing fell to the ground as far as I am aware. I only wish to say this: All gas shareholders must be careful to see, when these papers come round to them, that they are put into the waste-paper basket or, better still, into the fire. With regard to our business, the accounts are audited by several people. Several of your Directors take considerable interest in the accounts, and in seeing that they are properly, carefully, and thoroughly made up. Besides this, you have the three Auditors of the Company, who audit the accounts after the Directors have seen them. Then, again, you have the Official Auditor—Sir Robert Giffen—who goes most carefully and painstakingly into the whole thing. Therefore I think you may assume that your accounts can stand any amount of inspection from outside. Then with regard to the capital account, I may say we are always very careful to see that we do not charge too much to capital, and that revenue bears its proper share of expenses. Therefore you may take it—certainly the Chairman has said so, and I think you may also take it from me—that the dividend we are proposing to-day has been thoroughly and honestly earned. The resolution is: "That a dividend at the rate of 5½ per cent. per annum be now declared, and that the warrants be transmitted to the registered addresses of the proprietors by post."

Mr. DRUMGOLD seconded the resolution.

The CHAIRMAN: There is no remark about that, I suppose. When we earn more, we will pay more. That is all I can promise you; and I hope we shall some day.

The resolution was carried unanimously.

VOTES OF THANKS.

Mr. HOUNSOM proposed a hearty vote of thanks to the Chairman and Directors. Unfortunately, he had been unable to attend several of the meetings lately, and he had therefore additional pleasure in moving the resolution. Though they could speak for a long time on the subject on that side of the table, silence was, he thought, the best eloquence. But on behalf of the shareholders he might say that they did most heartily appreciate the splendid work that was put into the Company by the Board from the Chairman downwards, and thanked them, not only for what they had done in the past, but for what they were going to do in the future. They need not be too hungry after dividends. On that side of the table they liked a good dividend, no doubt; but there was something more. The Company had been an educational pioneer in the matter of bringing into view the consumers and the employees and putting them on an equality with the shareholders. They were all believers in equality here; and the interests of the three classes being identical, he hoped the gas industry would maintain the great footing it had in the country, and not only maintain, but increase it.

Mr. T. R. RICHARDSON seconded the resolution, which was unanimously adopted.

The CHAIRMAN: On behalf of the Board, I thank you most heartily for this kind vote. It comes very nice to us, because we feel that not only from the mover and seconder, but from the meeting it is a sincere expression of feeling towards us. If it were a mere matter of form, I would much rather be without it; but knowing as we do from many evidences that there is this feeling towards us, it is very gratifying indeed to the Board to have this appreciation from you. Now I have also another word or two, because there are others besides the Directors. I wish to propose a vote of thanks to the officers and employees generally. I do not know that I can say too much for them. I can say this, that the officers are thoroughly loyal to the Board. One of the happy things about it is that we feel our officers, with the men, are thoroughly loyal and true to us. If the men are true, the employees are true to themselves—they cannot then be false to anybody. I have not put it quite in Shakespeare's words; but I believe that men who will act like this will be just to the consumer and considerate also to the other officers and workmen, and I must say the feeling of the whole body is such that we are very proud indeed to be served by a body of officers and men like ours. I have therefore great pleasure in moving the best thanks of this meeting to our officers and workmen generally for their services to the Company during the past half year, coupled with the names of Mr. Carpenter, the Chief Engineer, and Mr. Bush, the Secretary.

Mr. ROBERT MORTON: I have great pleasure in seconding the vote of thanks, and I would take the opportunity of congratulating the technical staff on the immense relief they have got in the works through recent legislation. It has been anything but a bed of roses for a man managing a gas-works in the London district for the last twenty years. In the London district at all events managers have been in constant anxiety that something was going to go wrong with the purification, and that they would come under penalties. This, happily, has been got over; and I am quite sure the officers and all connected with the works appreciate the relief they have obtained. I congratulate them upon it.

The CHAIRMAN: I must add a word. My friend Mr. Morton has reminded me of something in the Auditor's certificate. The Auditor says: "I certify that the above accounts are correct. A forfeiture incurred during the half year, amounting to £4 must be borne and paid exclusively by and out of the divisible profits of the Company, and by way of reduction of dividend." This paragraph has appeared before; but I have never taken any notice of it, and have told the officers not to worry themselves about it. The Company have been required to make bricks without straw—a kind of Egyptian bondage; but we are free from that now. I refer to it because I believe this is the last time anything of the sort will appear in the accounts. We were fined 40s. on two occasions for having in our gas sulphuretted hydrogen in about the proportion of 1 part in 10,000,000 cubic feet of gas. Now we have obtained conditions that honest men can comply with without difficulty and without anxiety. I have great pleasure in putting this motion to the meeting.

The resolution was adopted.

Mr. CHARLES CARPENTER replied on behalf of the engineering staff. Sir George had mentioned the abolition of the ridiculous tests for purity, and had himself been struggling to get this relief for twenty-five

or thirty years. When it was remembered that the engineering staff had before them such an example of perseverance, it was not to be wondered at that they should do their best in the interests of the Company. From so many complex matters, it was difficult to single out one; but he would like to say that, for the first time in the history of the Company, the costs of handling and carbonizing coal had been less than 2s. per ton. Not many years ago they were over 3s. At the same time, the amount of gas they had been able to distil from a ton of coal had reached 11,000 cubic feet. Without sacrifice of quality, they had made this increase in quantity; and with just methods of testing now in vogue, the average of the official tests was 15·41 candles and of the Company's own tests 15·45 candles. So that in the past six months there had only been a difference of $\frac{4}{100}$ candle between their own and the official tests.

The CHAIRMAN: And our standard is 14 candles.

Mr. CARPENTER: Yes, Sir. The working could not have been brought to such a high state of perfection without the very best machinery; and he had no hesitation in saying that the most important of their machinery, the invention of the Chairman, was that which was called by the broad name of "Co-Partnership." But for the spirit which now animated all from the highest to the lowest, such results would have been impossible.

Mr. FRANK BUSH acknowledged the compliment on behalf of the Secretarial Department. One of the most gratifying features of the accounts was that the dividend declared had been earned. He was frequently asked by workmen in the business such questions as "Do you think the dividend will be earned?" and "Are we going to raise the price of gas?" Such questions, he thought, showed a very intelligent interest in the Company's business. With reference to a question recently asked by a shareholder, he quite agreed that the price of the debenture stock was very low, and had thought so for some considerable time; the present price being 87, at which figure the return was £3 9s. per cent. When it was remembered that the whole debenture interest in a year amounted to only £57,000, and that behind it was the entire ordinary capital, amounting to £6,350,000, the dividend on which for the past year was £347,000, he thought their debentures might be regarded as an excellent security, and saw no reason why it should not be put up 2 or 3 points.

COMMERCIAL GAS COMPANY.

Half-Yearly Report and Accounts.

The following is the report the Directors of the Company will present at the half-yearly meeting on Thursday.

The revenue account shows a net profit for the half year of £62,311 19s. 5d., which, added to the balance of £17,473 7s. brought forward from last year, produces a net revenue balance of £79,785 6s. 5d. Deducting therefrom £8850 3s. 3d. for interest, there remains standing to the credit of net revenue account a balance of £70,935 3s. 2d. available for dividend. The Directors recommend the payment of dividends thereout at the rates of £5 4s. per cent. per annum upon the 4 per cent. stock of the Company, and of £5 per cent. per annum upon the 3½ per cent. stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year.

The accounts accompanying the report consist of the usual statements. They show that the paid-up stock on the 30th of June amounted to £926,405; that £1,076,875 had been added on conversion, making £2,003,280; and that £222,445 remained unissued out of the total authorized (including premiums) of £2,235,000. The total amount borrowed on the above-named date was £339,062 10s., and £135,937 10s. was added on conversion; making a total of £475,000, and leaving £79,226 to be borrowed out of the £550,000 authorized. The receipts on capital account amount, with premiums, to £2,532,917 14s. 5d. The expenditure stands at £1,369,935 15s. 9d., with a nominal amount of £1,212,812 10s. added by conversion—together, £2,582,748 5s. 9d. There is consequently a balance of £49,830 11s. 4d. carried to the balance-sheet. The expenditure on capital account in the half year was £20,660, apportioned as follows: New and additional buildings, plant, &c., £1776; mains, services, &c., £3631; stoves, £4857; prepayment meters and fittings (less £6168 written off for depreciation), £10,396. The reserve fund amounted to £33,058; and the insurance fund to £31,713. The following is the revenue account:—

Expenditure.

Manufacture of gas—		
Coal and oil, including dues, carriage, unloading, and trimming	£81,370 7 9	
Salaries of Engineer and officers at works	2,145 0 0	
Wages (carbonizing)	18,243 17 3	
Purification—including £1830 4s. 1d. for labour	2,255 11 9	
Repair and maintenance of works and plant, materials, and labour, less £246 10s. 1d. received for old materials	25,445 16 8	
		£129,490 13 5
Profit sharing		2,798 3 6
Distribution of gas		27,886 3 4
Public lamps—lighting and repairing		2,775 15 10
Rent, rates, and taxes		12,261 12 11
Management—		
Directors' allowance	£1,250 0 0	
Company's Auditors	75 0 0	
Salaries of Secretary, Accountant, and clerks	1,176 2 4	
Collectors' salaries and commission	1,665 12 3	
Prepayment meter collection	1,833 8 5	
Stationery and printing	1,167 6 1	
General charges	2,108 11 11	
		9,276 1 0
Bad debts		898 6 10
Law and parliamentary charges		699 16 4
Superannuations and allowances		947 5 0
Official officers		252 9 2
Total expenditure		£187,286 7 4
Balance carried to net revenue account		62,311 19 5
		£249,598 6 9

Receipts.

Sale of gas—		
Common gas per meter at 2s. 5d. per 1000 cubic feet (75,350)	£179,454 1 11	
Public lighting and under contracts, common gas	5,987 4 7	
	£185,441 6 6	
Less discounts and allowances	3,747 12 10	
		£181,693 13 8
Rental—		
Meters (24,148)	£2,906 7 5	
Stoves (42,109)	6,652 5 5	
Prepayment meters (50,321)	9,083 10 1	
Incandescent mantle maintenance	446 4 10	
		19,088 7 9
Residual products—		
Coke, less £4753 15s. 11d. for labour	£27,496 6 10	
Breeze, less £648 5s. 10d. for labour	2,849 3 9	
Tar	7,039 2 11	
Ammoniacal liquor and sulphate of ammonia	11,339 7 4	
		48,724 0 10
Miscellaneous receipts—		
Rent receivable	£53 12 0	
Transfer fees	38 12 6	
		92 4 6
Total receipts		£249,598 6 9

The following are the statements relating to the manufacturing operations of the Company in the half year:—

Statement of Coals and Oil.

Description.	In Store Dec. 31, 1905.	Received During Half Year.	Carbonized During Half Year.	Used and Sold During Half Year.	In Store June 30, 1906.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	23,079	110,313	106,770	647	25,975
Cannel	2,508	..	..	..	2,508
Total	25,587	110,313	106,770	647	28,483
Oil—gallons	267,245	1,209,470	1,080,424	..	396,291

Statement of Residual Products.

Description.	In Store Dec. 31, 1905.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1906.
Coke—tons	6,883	65,396	15,669	52,693	3,917
Breeze—tons	305	14,333	..	14,147	491
Tar—gallons	513,145	1,322,646	..	1,325,660	510,131
Ammoniacal liquor—butts	8,188	33,994	38,867	..	3,315
Sulphate of ammonia—tons	145	1,233	..	1,293	85

Statement of Gas Made, Sold, &c.

Quantity Made (meter register and estimated).	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lights.
	Public Lights and under Contracts (estimated).	Private Lights, per Meter.		
Thousands.	Thousands.	Thousands.	Thousands.	
1,633,375	41,917	1,488,642	1,555,059	4093

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coals, oil, &c., £22,236; coke and breeze, £2243; tar, ammoniacal liquor, sulphate of ammonia, &c., £5527; sundry stores, £29,969—total, £59,975. A sum of £15,961 stands in the balance-sheet as employees' bonus and savings.

Gas v. Electricity at Aldershot.

A statement having appeared in a local paper showing the comparative cost of gas and electricity for street lighting in Aldershot, and the matter being one of interest, not only to the inhabitants of the town, but to those of the surrounding districts in regard to the cost of electricity, Mr. R. W. Edwards, the Secretary and General Manager of the Aldershot Gas and Water Company, offered the following remarks on the statement: "The cost of electricity, &c., for street lighting in Aldershot for the year 1903-4 was £307; the cost of electricity, &c., as above, for the year 1905-6 (42 lamps) was £340 4s. 6d.—total, £647 4s. 6d. According to the Council's returns, the average revenue derived from street lighting for the two years in question, per Board of Trade unit, was: 1903-4, 2·29d.; 1905-6, 2·28d. The cost of electricity was: 1903-4, works and management, 2·46d.; loan and special charges, 2·07d.; gross cost, 4·53d. 1905-6, works and management, 2·27d.; loan and special charges, 2·31d.; gross cost, 4·58d. This shows an undercharge against the street lighting as follows: 1903-4, 2·24d. per Board of Trade unit; 1905-6, 2·30d. For the year 1903-4, 32,354 units were consumed by street-lamps, representing an undercharge of £301 19s. 4d.; and for the year 1905-6, 32,566 units were consumed, representing an undercharge of £312 1s. 9d. For the two years, street lighting has been undercharged £614 1s. 1d. In other words, the real cost of electricity for street lighting in that period was £1261 5s. 7d., or nearly twice as much as that actually charged." Mr. Edwards suggested that the statement previously published could not be submitted as a fair comparison of the cost of electricity with gas. Briefly, for the past year, 339 gas-lamps (incandescent and flat-flame) cost £779, or an average of £2 6s., against 42 electric lamps (arc and incandescent), costing £652 6s. 3d., or £15 10s. 7½d. per lamp.

SOUTH SUBURBAN GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Friday, at the Albion Tavern, Aldersgate Street, E.C.—Sir GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Charles M. Ohren) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

THE FULL DIVIDEND EARNED.

The CHAIRMAN said those present had no doubt read the report, for their presence was evidence that they were interested in the Company, and if they were they would have studied the report, which gave, as far as the Directors were able to give, a full and true statement of the position of the Company. There were several points in it of importance. Of course, as from the shareholders' point of view, the matter of most importance—well, he did not like to say this, because they might have higher views than the mere mercenary one of the money—but it was an important point that they should have earned the dividend in the half year. They had earned sufficient to pay the dividend, but not much over—only about £60. The result was that they would carry forward £3711 to the credit of the the next account. The full dividend to which they were entitled was 5½ per cent.; and having earned it, the Directors, in the report, recommended that it should be paid. They were in a very good position indeed in regard to their reserves, as was stated in the report.

THE COST OF COAL.

Turning to the working, the coal contracts for the twelve months had been made at an appreciable advance. Coal, in fact, in the last half year had cost appreciably more than in the corresponding half of the previous year, because the advanced price began from March. Coal had cost them over 1s. a ton more, while the products had only brought in 7d. per ton more. Coke was a little better, tar was rather worse, and ammonia was somewhat better. He might say that the ammonia had produced better results, not because they had obtained a higher price, but because Mr. Shoubridge had succeeded in working better—he had secured more ammonia per ton of coal than in the corresponding half year. This was the main reason why they had got a slightly better return from ammonia.

REDUCTION IN THE PRICE OF GAS.

The next matter of importance was the announcement of a reduction of 1d. per 1000 cubic feet in the price of gas. The Directors would have been very glad indeed to have made a greater reduction than this; but it was not possible, with the increase in the cost of coal, the low price of residuals, and with no surplus practically on the half year. There would, however, be certain savings. There would be no parliamentary expenses; and the cost of re-building the large retort-house would soon disappear from the accounts. Part of this cost they had had to carry to suspense. There was an item in the balance-sheet "Suspense Account, No. 3 Retort-House, £6000." This would have to be redeemed out of revenue in the course of a year or two.

THE QUESTION OF ILLUMINATING POWER.

Then there was another saving that they would effect. They had to use for the purpose of enriching gas last half year 28,000 gallons of carburine, at 8d. per gallon, which came to over £900. Now this would all be saved. Here was an expense incurred for no good whatever. It was due to ignorance and prejudice on the part of the authorities—Parliament and others. They had considered it necessary and advisable to require companies to supply gas of a higher illuminating power than could be obtained from the available supply of coal; and to do so, they had to use a large amount of this enriching material, which never did the public or the consumer one atom of good. It was all sheer waste; and he thought the Company might take some credit for having done their share in trying to break down this prejudice and dissipate the ignorance on which it was based. The South Suburban Company had done their part in endeavouring to convince Parliament, and to get Parliament to alter its course. They did convince Parliament that it was altogether a mistake to require this high illuminating power. Many thousands—he thought he might say hundreds of thousands—of pounds had been absolutely wasted in England in this way, simply as a consequence of ignorance and prejudice, which the South Suburban Company had done their part in dispelling. They would gain a benefit in the next half year of nearly £1000 by abolishing this useless enrichment.

THE PARLIAMENTARY STRUGGLE.

Now he came to the really most important matter. These savings had justified the Directors in making the announcement of a reduction of 1d. per 1000 cubic feet. But the most momentous part of the report was that which referred to the parliamentary struggle which the Company had undertaken in order to gain freedom. Four years in succession they had been to Parliament. The usual plan was for a company to apply to Parliament for authority to do certain things; and Parliament gave its decision one way or the other. This decision was usually accepted. Well, their Company did not accept it. They felt that they were right—that what they were only asking for was for the advantage of the public and for the general benefit—and they were determined to press the matter till Parliament and the local authorities were convinced that they were right. And so they had made a record. There was no case of a gas company since gas was first established going to Parliament four years in succession for the gaining of a certain object. The objects were stated last year; but he might recapitulate them. The report twelve months ago stated that in 1903 a Bill was introduced (1) to enable the Company to abolish the nuisance to the neighbours of the gas-works caused by the use of lime for purification, (2) to save the cost of useless enrichment of the gas, and thus reduce the price, and (3) to enable the Company to offer new issues of stock direct to the consumers and employees at the market price. They obtained these three things one after the other. They secured power to issue stock to consumers at the market price. They got authority to abolish the use of lime, which had saved something in the matter of expenditure, but had also done a great deal more—it had saved the workmen from the most unpleasant operation of emptying the purifiers, and dealing with the foul spent lime; and it had saved the neighbourhood from a great cause of nuisance. All complaints had ceased since they abolished the use of lime. And now the Company had secured a reduction of the illuminating power.

REDUCTION OF CANDLE POWER.

In 1893, the Company were in Parliament. Prior to that, their standard illuminating power was 14 candles; but they were then required to raise it to 15 candles, for which he believed there was some consideration given. They had a standard price, under the sliding-scale, of 2s. 10d. to 3s. 2d.—that was, the dividend was not to be increased until they reduced the price of gas below 2s. 10d. per 1000 cubic feet, but it was not to be reduced until they raised the price above 3s. 2d. Now, he thought one reason for this margin was that they were required to raise the quality of the gas 1 candle—from 14 to 15 candles—thereby incurring certain expense for enrichment. They were never able to make the 15-candle gas without enrichment; and to get free from this objectionable condition, they had applied to Parliament, and at last had been successful. In 1903, they asked that the quality might be reduced from 15 to 13 candles; and they repeated the request in succeeding years, until the present year. There was, however, a great deal of difficulty raised by the local authorities with regard to the proposed reduction to 13 candles. They said, "We agree to 14 candles;" but the Company replied, "It is not low enough. We cannot be certain of producing 14-candle gas without enrichment." At last, an extraordinary thing happened. The following statement appeared in the report: "The Directors have the pleasure to state that this year all the local authorities, including the London County Council, led by Beckenham, have acted fairly and reasonably; several of the local newspapers also have put the Company's case clearly and justly, with the result that another expensive parliamentary contest has been avoided." Mr. Shoubridge and himself saw the Clerk to the Beckenham Urban District Council; and the result of the conference with him was that the Council took the lead in the compromise. Though they were not willing to agree to the reduction to 13 candles, they said, "Let it be 14 candles, and we will accept the London conditions as to testing." This meant that there would now be no penalty for the first half-candle. Under the old system of testing, if the quality fell by 1-100th part of a candle below the standard, they would take proceedings. Now, gas-testing was not an exact science, and it was impossible to estimate the value to a small fraction of a candle. In London, under the Metropolitan Board of Works, in 1875 or 1876, there was allowed half-a-candle; and the authorities who were dealing with the South Suburban Company had granted the same concession. In the case of the gas being only half-a-candle below the nominal standard, there would be no penalty; while the penalty for the next half-candle was not to exceed £5. All things considered, this was quite as good as the 13 candles the Company asked for at the start.

THE METHOD OF TESTING.

There was another thing he had to mention. One of the great disputes with the authorities was as to the method of testing. They wanted the gas tested in a way that would depreciate its quality. It was laid down by Parliament in 1868 that, in testing the illuminating power of gas, such a burner should be used as would develop the utmost light—provided it was suitable for the consumers. This was the "Gas Companies' Charter." Of course, there were all sorts of burners. If a gas with a good burner gave 15 candles, another burner might be found with which it would give only 5 candles. The principle laid down by Parliament was right; but during the last few years, they had had a great tussle with the London County Council, chiefly with regard to the testing. At last, however, it had been settled that the gas was to be tested in the burner that would develop the utmost light. One result of this fight had been that they had at last got the system of testing put on a perfectly fair footing. A burner would be used that would certainly give them an equivalent to 13-candle gas, simply because the gas would be tested fairly and properly. They might therefore congratulate themselves upon the action of the Company during the last four years. They had got all they asked for simply because it was just and right. They had protested against an unjust and an unfair system; and because it was so, they had overcome it. He thought that no unjust system, or law, or regulation could last unless those who suffered from it submitted to it. If they would not submit—as the South Suburban Company refused to submit—the time would come when they would get freedom and relief. This was the principle on which the Company had acted.

ALTERATION IN THE SLIDING-SCALE.

He ought to say also in regard to this Act that there had been an alteration in the sliding-scale. Under the old initial or standard price, they were to get no increase of dividend unless the price went below 2s. 10d. per 1000 cubic feet. This had now been reduced to 2s. 9d.; but concurrently with this reduction there was an increase in the rate of dividend. Previously, for every 1d. they reduced the price they were allowed to increase the dividend by 2s. 6d. per cent.; but now they were allowed to increase it by 3s. 4d. per cent. At a price of 2s. 6d. per 1000 cubic feet, they got just the same dividend with the reduced standard as they did with the old standard; but when they got below 2s. 6d., they would be entitled to 3s. 4d. extra for every 1d., instead of 2s. 6d. For instance, they were now entitled to 5½ per cent. with gas at 2s. 6d. per 1000 cubic feet. With the new reduced standard, they were also entitled to 5½ per cent. with gas at 2s. 6d. If they sold it at 1d. more than this, they would be entitled to divide £5 6s. 8d., instead of £5 7s. 6d.; but they were not contemplating raising the price. As, however, they went down 1d. by 1d. below the 2s. 6d. per 1000 cubic feet, they would gain slightly. With the present reduction to 2s. 5d. per 1000 cubic feet, they would be entitled to £5 13s. 4d. dividend, instead of £5 12s. 6d. The latter was a very awkward amount, because it would come to fractions of a penny in the

case of many holdings. With 3s. 4d.'s, however, every shareholder's dividend came to even pennies. So that if all should be well next half year—if they earned it—they would pay increased dividend of £5 13s. 4d. If they had remained as they were under the old system, they would only have been entitled to £5 12s. 6d., and would have only got £5 10s. Mind, he did not promise the higher figure, because he did not know what was going to happen; but they had now got a sliding-scale that would be very convenient.

THE RESULTS OF CO-PARTNERSHIP.

The only other point he had to touch upon was the co-partnership system. There was a large sum—close upon £3000—paid to the employees. The Company paid the current rate of wages and salaries—at all events, they paid what enabled them to get a sufficiency of good men and officers; and in addition there was the distribution under the co-partnership scheme. The shareholders might ask why this amount should be paid. Well, there were several reasons. They believed in interesting the employees in the Company. Under the old wages system, a man gave so much time and got so much money; but he had no interest in the prosperity of the Company, and such good work as was done by numbers of men was due to their conscientiousness. The wages system, in his opinion, was a distinct discouragement to the best work. They said to the men, "We will give you a direct interest in the prosperity of the Company;" and they believed that this £2945 was earned—that it was no loss whatever to the shareholders. But the shareholders gained in another way. The system afforded the Company absolute security against a strike; because there was no possibility of men striking against themselves. The bonus that they got was thus not wasted. If it were a mere profit-sharing bonus paid in cash, the men would spend it and be none the better; but practically the whole of the money was saved and invested in the Company, either in stock or on deposit. The fact that the men were saving this money placed them in a position of independence instead of dependence; and this he was sure tended to make them better men in every way, and therefore better servants of the Company. This was a justification; and, moreover, the Directors felt that, as employers, they had a certain responsibility. If it was in their power to benefit those who worked for them—and they said it was—their duty was to do it. They believed they were benefiting the employees, and rendering them a good service, which would enable them to make provision for their old age, and place them in a better position in every way. It was encouraging them in habits of self-denial and self-control, and so the Board believed was benefiting them morally as well as materially. They felt, as employers, it was their duty to do anything they could in this direction. (Hear, hear.)

PRAISE FOR THE NEWSPAPERS.

He had already read the remark in the report with regard to the local newspapers. To the Directors' great surprise, the newspapers had inserted articles dealing clearly and justly with the Company's case. One of these articles was read at the Board, and a colleague said to him, "That is your article." He, however, assured him that he had had nothing to do with it. It was a very fair and proper article; and whoever wrote it knew what he was writing about. The extraordinary thing was that the newspaper should publish any such article. There had, however, been several articles taking up the case of the Gas Company, and putting it most fairly. This was a new experience; and they thanked the newspapers for the honesty and justice with which they had acted towards the Company. He concluded by moving the adoption of the report and accounts.

Sir J. FORTESCUE FLANNERY, Bart., D.L., seconded the motion, and said there was only one remark he wished to make in so doing. It was as to the £3000 which had been distributed among the employees as bonus. The Company had about 500 employees; so that the sum represented an average of £6 each per annum, or as nearly as possible 2s. 6d. each per week. If any of the shareholders present had had experience in the workshops as he (the speaker) had had, they would know how easy it was for a man to make himself 2s. 6d. better or worse in the course of a week's work. (Hear, hear.) To his mind, there was no expenditure mentioned in the accounts that was more in the interests of the shareholders than this item of 2s. 6d. a week to each man throughout the year.

The motion was at once carried unanimously.

The DEPUTY-CHAIRMAN (Mr. Robert Morton) proposed a dividend for the half year at the rate of 5 per cent. per annum on the preference stock and 5½ per cent. per annum on the ordinary stock – less income-tax. Referring to the relief the Company had obtained by the abolition of the sulphur clauses, he remarked that it used to be a very irksome business to carry on a works under severe tests and the possibility of a penalty arising from the tests. In one way the tests were really more of a farce than anything else; but they were not a farce to Mr. Shoubridge and all who were looking after the works. Now they could go home and rest quietly, without any fear of an adverse test.

The CHAIRMAN remarked that they had two Workmen Directors there that day—Mr. W. G. Waller and Mr. R. Wyllie. He would ask Mr. Waller to second the motion.

Mr. WALLER said he had much pleasure in seconding the proposal, and would take the opportunity of expressing his thanks and those of his colleague, Mr. Wyllie, for the honour that had been done them by their election as Directors. They would do their utmost to promote the interests of the Company, in whose service they had been for many years. In connection with co-partnership, he might say that he had seen many instances of the interest the men took in their work; and he cited one or two cases. He was quite certain that the money distributed had been saved to the Company by the exercise of care. Speaking from his lifelong experience on a gas-works, he could assert that since the introduction of profit-sharing there had been a marvellous improvement in the men of the South Suburban and South Metropolitan Companies.

The resolution was unanimously agreed to.

The CHAIRMAN next proposed a vote of thanks to the officers, of whom, and the subordinates, he spoke in the highest praise. Much of the Company's prosperity, he said, was due to them. Both officers and workmen were actuated by a sincere spirit of goodwill.

Sir FORTESCUE FLANNERY seconded the motion, remarking that the Company had as fine an organization, from the principal officers downwards, as any manufacturing concern in the whole of England.

The vote having been accorded,

Mr. S. Y. SHOUBRIDGE, speaking on behalf of the engineering staff and workmen, thanked the Directors and shareholders for their kind recognition of the services rendered, and also for the handsome bonus that had been given them for last year. He thought it might fairly be said that the whole of the employees were animated by the desire to promote the success of the Company, and to do their utmost to earn the bonus.

INCANDESCENT BURNERS AND GAS CONSUMPTION.

There was one matter mentioned in the report to which the Chairman had not referred, and that was the statement that there had been no increase in the output of gas this year. The report said that the reason for this was to be found in the incandescent mantle.

The CHAIRMAN: It is practically the same as last year, is it not?

Mr. SHOUBRIDGE assented, and remarked that, as the officers had been doing their very utmost to push the incandescent mantle, and had introduced it into the churches, chapels, halls, and public lamps, as well as in shops for outdoor and indoor lighting, he was greatly surprised that there had not been a large reduction in the output. This was accounted for by the fact that the business of the Company was really increasing considerably. He found that they had 1122 more consumers, or 3¼ per cent., than at the corresponding period of the previous year; and there was an addition of nearly 900 gas-cookers, or 3½ per cent. As regarded gas-fires, there was an increase of 590, or about 80 per cent. So that, in spite of the active competition that they experienced from their electrical friends—both municipalities and private companies—their own business was in reality increasing at a very satisfactory rate, and was not (as might be supposed from the fact that there was no increase in the output) at a standstill. He thought that the growth of the use of gas for heating, as shown by the large number of fires that had been sold, was one of the most satisfactory features of the business; and he had no doubt that in the future it would be greatly stimulated by the reduction in price which the Board had recently granted.

Mr. OHREN also briefly acknowledged the vote on behalf of the clerical staff.

Mr. ARTHUR ROSS proposed a vote of thanks to the Directors. He said that the business was conducted on principles which made anyone feel confident about the future.

Mr. WARTH seconded the proposal, which was agreed to.

The CHAIRMAN said he and his colleagues were much obliged for the vote, which they felt sure was not a mere matter of form. As far as the business of the Company was concerned, the Directors were animated by a desire to deal fairly and considerately with all interests. They were not looking solely to the interests of the shareholders. They did not believe in a selfish policy of this kind; they did not think it the right or the best policy. They endeavoured to deal fairly with the consumers and employees, and justly to all parties; and so long as they were able to keep to these principles, there was no need to fear for the welfare of the Company.

BROMLEY GAS CONSUMERS' COMPANY.

Larger Increase in the Make and Sale of Gas.

The Ordinary Half-Yearly Meeting of this Company was held last Thursday, at the "Bell" Hotel, Bromley—Mr. ALEXANDER DICKSON in the chair.

The SECRETARY (Mr. H. W. Amos) read the notice convening the meeting; and the report and accounts were taken as read. The former stated that the increase in the make of gas in the six months to June 30 was 7½ million cubic feet over that of the corresponding half of last year.

The CHAIRMAN said that, as this meeting of the Company fell just after the commencement of the holiday season, he intended—as he intimated last year it would be as well to do—to regard the summer meetings as merely interim ones, for formal purposes, unless any matters of emergency otherwise necessitated. So in moving the adoption of the report on the present occasion, he would simply pause to offer the shareholders a brief but very cordial expression of congratulation upon the Company having had a larger increase in the make and sale of gas this last six months than they had for many years. This was highly encouraging; and they were glad to know that the same conditions had prevailed through the warmer month of July as preceded that time. So that, on the one hand, they could recognize the favourable influence which the colder atmospheric conditions had on the business; while, on the other hand, he thought they might conclude that the use of gas for cooking purposes was becoming much extended. He would also tender the shareholders a word of congratulation on the sustained value of the Company's stock, as evidenced by the result of the recent sale of the "A" stock, at which he dared say some, if not all of them, knew that the prices realized ranged from £120 10s. in the earlier biddings of the sale to £124 for the later lots; the average price being £121 12s. 6d., or, less the expenses, £120 13s. 10d. for each £100 of the stock. Adverting to the accounts which they had had presented to them, he thought they would find that, among the principal variations, the gas and meter rental yielded £916 more than in the corresponding half year, and coke £79; while the £59 additional from sulphate was due to a larger quantity, which was sold at a lower rate. On the expenditure side of the revenue account, the largest of the increases arose from the advanced contract price of coal. There was £696 under this item. The sundry other variations were for the most part increases due to the ordinary growth of the business, amounting to £419; and they were set off by certain reductions to the extent of £334. In the result, the undivided profit balance was £11,240 11s. 7d., which provided for the payment of the dividend at the same rate as heretofore, and would leave them with a

balance of £4512 to carry forward. He might just say, in passing, that before arriving at this result, the Directors had (as had been their custom in recent years) taken care to write off the proper sums for depreciation; and they had borne in mind the intimation given in the last report, that a part of the outlay for the coke-conveyor and the rotatory yard-crane—those new works which were now in progress—would have to be met out of revenue funds when finished. He thought the shareholders would regard the state of the unexpended profit balance as, in that aspect, quite satisfactory. He did not know of any other items on which he need detain them; but if there were any points on which shareholders would like information, he would be pleased to answer inquiries. He concluded by moving the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Mr. B. H. Latter) seconded the motion; and it was agreed to without discussion.

The CHAIRMAN then moved the declaration of dividends for the half year at the rate of 6 per cent. per annum upon the "A" ordinary stock of the Company, and at the rate of 4½ per cent. per annum upon the "B" ordinary stock, both less income-tax.

Mr. A. S. GEDGE seconded the proposition, and it was unanimously agreed to.

This concluded the business before the meeting.

WEST HAM GAS COMPANY,

Further Reduction in the Price of Gas.

The Ordinary Half-Yearly Meeting of this Company was held last Thursday, at the Liverpool Street Hotel, E.C.—Mr. J. L. GODLEE in the chair.

The SECRETARY (Mr. A. G. Snelgrove) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said he did not think there was much to be found in them that would oblige him to detain the shareholders for more than a very short time. He hoped there was no doubt that they would find the general result satisfactory, as the balance of the net revenue account was £30,857, or £1077 more than at the same time last year, though they had been charging 1d. per 1000 cubic feet less than was the case twelve months ago, and had continued to follow their policy of dealing liberally with the depreciation account. The coal contracts made last year on favourable terms were still running; and the cost of coal, oil, &c., per 1000 cubic feet of gas sold worked out at almost exactly the same figure as twelve months ago. So far as one could anticipate, they could not expect to get such favourable terms after next Midsummer. It seemed practically certain they must pay more for coal and oil at the end of that time. The Board entered into two years' contracts last year, which had been extremely favourable; but they expired next Midsummer. They had been able to reduce the manufacturing charges per 1000 cubic feet sold from 9·03d. to 8·55d., or about ½d. The shareholders would notice a material increase in rates and taxes; but in the result this worked out very nearly the same charge per 1000 feet sold as last year. The matter of the Company's assessment—to which he had, he thought, referred more than once before—was still unsettled. For two or three years they had been discussing rates and taxes with the local authorities; and yet the question did not get finally adjusted. For one thing, Mr. Marshall, who advised the Company, had died; and this had had something to do with postponing the settlement. He believed he referred at the last meeting to the Bill introduced into Parliament for the London Outer Circle Railway, by which it was proposed to authorize a line running through part of the Company's new works at East Ham. He said then that, if the railway was made on anything like the lines suggested, it would very materially interfere with the Company's works. The Board presented a petition against the Bill, which they eventually withdrew, on an agreement being made with the promoters which the Directors considered satisfactory. They managed to get the lines of the railway altered, and to put the Company into as good a position as was possible if the Bill was to pass at all. The Bill was, however, thrown out; and it might be hoped that it would not appear again, for a time at any rate. He thought the Committee told the promoters that they might stay away for ten years, as the railway was not likely to be wanted till then. The law costs mentioned in the accounts included charges connected with these negotiations. The shareholders would note that the receipts for gas from ordinary consumers showed a decided increase, notwithstanding the reduced price, and that the total receipts for gas were over £8000 more than they were last year. If they turned to the account of gas made, they would observe a rise from 696 to 766 million cubic feet—being an increase of 10·03 per cent. The increase during the five or six weeks since the close of the half year had been about 16 per cent. over the same period of last year. This would very likely not be maintained throughout the six months; but it seemed clear they must still look to providing for an annual increase of at least 10 per cent. for the present. Of course, a very large amount of these increases was caused by the consumption through automatic meters. These consumers went on increasing, and now considerably exceeded those using ordinary meters—there being some 23,000 persons now taking gas in this way. And the proprietors would remember that the Company did not begin to sell gas in this manner till the commencement of 1903. This class of consumer involved the Company in heavy capital charges, and heavy payments out of income by way of depreciation of meters and fittings. But the satisfactory issue of £100,000 of ordinary capital and £35,000 of debenture stock enabled them to provide for their capital charges for some time. Some of the shareholders living in West Ham would be aware of the rising of a large new building on the works there. The Company were putting up a new retort-house of modern type. It was not finished; but the Directors hoped it would give very good results when it was got to work. The big holder at East Ham was of great assistance to them in distributing gas to the consumers last winter; and next winter's work would be impossible without it. This entirely justified the expense the Directors went to in erecting this holder. The new rental department in the Company's office, which, as he had stated in February, had then been just started, was now working satisfactorily, and fulfilling the anticipation of the Board in regard to it. At the half-yearly meetings in August he did not trouble the proprietors with as many observations on the accounts as he usually did at the winter meetings, when they had a whole twelve months' figures before them. He might, however, sum up the matter by adding that the net profit this half year worked out at 8·64d. per 1000 cubic feet of gas sold, as against 9·48d. last year. This was a reduction of only 0·84d.; while the Company had been charging 1d. less for gas. This was a useful way of looking at the matter of the working as a whole. In view of this result, and the prospect of continued increase in business which seemed certain, the Directors had that day decided to further reduce the price of gas by 1d. per 1000 cubic feet—that was, to 2s. 9d.—as from Michaelmas next. It was a satisfaction to them to feel justified in taking this step, as their Corporation rivals were very active pushing their electric light business. It was sometimes difficult to see how they could justify some of their methods, if they had to show a satisfactory balance-sheet to a body of proprietors. There was a certain monotony about the conclusion of his speeches to the shareholders on these occasions; and he was very glad of it, for he had nothing to alter or amend in what he had before said to them as to the admirable way in which the officers in all departments of the works carried out the duties entrusted to their charge.

The DEPUTY-CHAIRMAN (Mr. T. S. Geere) said that he had much pleasure in seconding the adoption of such a good report as that which the Directors had been able to submit on the present occasion. There was still an old sore—the large increase in rates and taxes, which the Chairman had just alluded to. However, he (the speaker) saw a prospect in a half-year's time of having a substantial reduction. In the last rates, they had not the benefit of the grant the Government had given in the reduction of the School Board rate; but he thought they would receive this benefit the next half year, and that it would amount to something like 3d. or 6d. in the pound. He thought it was very unfair to have taxation without representation; companies ought to have a vote as regarded parochial affairs.

The report was then adopted without any questions being asked.

On the proposition of the CHAIRMAN, seconded by Mr. H. C. PELLY, dividends were declared for the half year at the rate of 5 per cent. per annum on the 5 per cent. preference stock, and £5 2s. 6d. per cent. per annum on the consolidated ordinary stock.

The Rev. T. TEED-HEAVER proposed a hearty vote of thanks to the Chairman and Directors for the splendid way they had managed the shareholders' property.

Mr. WIGLEY seconded, remarking that he was sure the proprietors would desire to include in the vote the officers of the Company, who had ably assisted the Directors.

The proposal having been carried,

The CHAIRMAN returned thanks on behalf of himself, the other Directors, and the officials. They were all, he said, doing their very best for the interests of the Company. The Board were exceedingly glad that they were able to present such a satisfactory report as they had done that day. What he had said about the officers when moving the adoption of the report was absolutely true; and they certainly deserved the vote of thanks.

This concluded the proceedings.

Stockport and the Kinder Water-Works.

A private meeting of the Stockport Town Council was lately held, for the purpose of discussing the position in connection with the Kinder water scheme. The Council had to consider the following points: (*a*) The contract dated Sept. 12, 1901, between the Corporation and Mr. James Mansergh (now deceased) for his services as Engineer. (*b*) The contract dated April 3, 1905, between the Corporation and Mr. Ernest Lawson Mansergh for his services as Engineer. (*c*) The contract dated May 12, 1903, between Mr. Abram Kellett and the Corporation for the construction of Kinder reservoir and other works. According to a report in a local paper, Mr. A. Johnson, the Chairman of the Water Committee, made a statement to the Council, after which it was proposed and seconded that the contract with the Engineer be determined by arrangement. The resolution was carried. It was also proposed and seconded that the contract with the Contractor be determined; and this resolution was also carried. The whole scheme was originally estimated to cost £819,000; and the estimate for the construction of the Kinder reservoir, which was to have been completed in seven years, was £248,000. It is thought probable that later on a modified scheme will be presented, and an earth dam substituted in place of the stone one.

Incandescent Gas Lighting for South Shields.—Mr. P. M. Crosthwaite, M.Inst.C.E., one of the Inspectors of the Local Government Board, held an inquiry last Wednesday, at the South Shields Town Hall, into an application by the Corporation for sanction to borrow £4000 for street lighting. Mr. J. Taylor, the Assistant Town Clerk, said the amount was for the conversion of the present flat-flame burner lamps into incandescents. There were at present 2612 flat-flame lamps in use in the borough, and the annual charge for these was £2 15s. 6d. per lamp. The Gas Company proposed to increase the charge to £3 10s., which would mean an increase of £1541 17s. a year for street lighting. In order to avoid some of this heavy cost, the Corporation proposed to convert 2200 lamps; and the future cost per lamp would then be £2 18s. The town would also get the benefit of a much better system of street lighting. Alderman J. R. Lawson, the Chairman of the Parliamentary, Gas, and Water Committee of the Corporation, said the change was most desirable in the public interest, as for an extra annual cost of 2s. 6d. per lamp a greatly superior light would be obtained.

PROVINCIAL GAS COMPANIES.

Prosperity at Cambridge.

In moving the adoption of the report at the half-yearly meeting of the Cambridge University and Town Gaslight Company, the Chairman (Mr. E. H. Parker) said he thought the shareholders would agree that the Directors might venture to again congratulate them on the continued prosperity of the Company. As they would see from the report, the trading for the half year had been quite satisfactory. It was proposed to pay the maximum dividend. They had sufficient money to do this and carry forward a balance to the profit and loss account of £265. Another satisfactory feature of the report was that the Directors had been able to reduce the price of gas to 2s. 10d. per 1000 cubic feet. The works of renewal which had been proceeding for so many years were still going on. During the last half year, gasholder No. 2 had been in course of renewal. The cost of this was somewhat heavy; but it was work which was absolutely necessary. It would be in order shortly now; and when it was completed, it was proposed to undertake another large renewal, and build a new purifying house. The Bill which the Company promoted to remove the sulphur restrictions, they would be glad to hear, had now received the Royal Assent. There were a few features of the accounts to which he might venture to point. The make of gas per ton carbonized was again very satisfactory—namely, 11,059 cubic feet. This compared favourably, he thought, with the results obtained by any gas company in the kingdom. A great deal of credit for this was due to their Manager (Mr. J. W. Auchterlonie), to the carbonizing foreman, and generally to the whole staff, whose work was good in every way. While on the subject of officers, he would like to say they were immensely indebted to Mr. S. G. Wheaton, the Accountant, for the extremely accurate way in which all the complicated and minute accounts were kept. The Auditors always had words of praise for him; and they were thoroughly well deserved. The make of gas again showed an increase; this time of 4,857,000 cubic feet. There was nearly every half year a satisfactory increase—showing that the Company were in a very sound, progressive state. The slot business also showed an increased trade. They now supplied through 2703 slot meters; and the gas consumed in these meters amounted to over 30 million cubic feet. Considering that this method of supplying gas had been in operation only two years, the Directors thought the result very satisfactory. The increase in the number of ordinary consumers was gratifying—namely, 46; and the consumers using cookers had increased by 83, which showed that this branch of the business was also good. The slot meters had increased by 233 during the half year; and the slot stoves by 223—a very large increase. The report was adopted; and the maximum dividends were declared.

Increased Domestic and Trade Supplies at Littleborough.

At the half-yearly meeting of the Littleborough Gas Company on the 2nd inst.—at which, in the absence of the Chairman of the Company, Mr. Alfred Law, J.P., the Vice-Chairman (Councillor J. C. Hudson) presided—the balance-sheet submitted showed an increase in gas sales of £4093, compared with £3821 last year. The receipts from residuals showed a decrease, due to a reduction in the price obtained for coke. The amount expended on coal was £1493, against £1500. The profit on the revenue account was £1402, compared with £1306 last year. The balance of net profit, subject to dividend, was £2720. The Chairman stated that the results were exceedingly satisfactory, especially considering the heavy renewal charges which were included in the accounts. There had been 2758 tons of coal carbonized, producing 29,558,400 cubic feet of gas, giving a yield of 10,717 cubic feet per ton. Last year 2802 tons of coal were carbonized, and 26,763,900 cubic feet of gas made, giving 9548 feet per ton. The quantity of gas sold was 27,943,000 cubic feet, which gave 10,131 feet per ton of coal, and represented an increase of 9 per cent. The amount of coke available for sale was 10·5 cwt. per ton of coal carbonized, against 9·2 cwt. last year. The total quantity of gas made for the past twelve months was 61,284,400 cubic feet, which was a record. Despite the fact that the district and population are not increasing, the gas sales have advanced during the last five years by 8 million cubic feet, or about 15 per cent., which is absolutely due to the extended use of gas for domestic and trade purposes. A dividend at the rate of 10 per cent. per annum was declared for the half year; and the shareholders passed a vote of thanks to the Directors, the Manager and Secretary (Mr. S. E. Halliwell), and the staff, expressing their satisfaction with the results.

Fighting Electricity and Dust at Malton.

The report of the Directors of the Malton Gas Company for the six months ending the 30th of June, which was presented at the half-yearly general meeting last Wednesday, set forth that there had been a satisfactory increase in the quantity of gas sold, and the business of the Company had been well maintained. The balance of profit to be dealt with amounted to £3412, out of which the Directors recommended a dividend at the rate of 12 per cent. per annum free of income-tax, and the carrying forward of a surplus of £1850. The Company had obtained the contract for the public lighting of Norton for another three years. In moving the adoption of the report, the Chairman (Mr. Hugh W. Pearson) said that the Company had concluded the first year of their competition with electricity; and though they had lost the contract for the lighting of the town, the consumption of gas for private purposes had increased by more than 2 million cubic feet as compared with the first half of last year. The dividend the Directors proposed to pay had been actually earned during the half year. They had, as the shareholders would see from the report, secured the contract for the public lighting of Norton for the ensuing three years. For this the Directors were glad, because it would give them an opportunity of showing that they were fully competent to compete with the electric light people at Malton. All they needed was fair play; and he thought that when the ratepayers of Norton saw that they were getting a greatly improved light at a cost 15 per cent. less per lamp than was being paid in Malton for the electric light, they, too, would be very greatly pleased. Another satisfactory feature to which he might refer was the experiment now being carried out by the Malton Urban Council with oil tar for the purpose of preventing the great dust caused by motor cars, &c., on the highways, which was so much complained of. The trials were being watched with great interest in Malton. Hitherto this product of gas manufacture had been looked upon and treated as almost useless; but if it proved to do what was claimed for it, they would in future profit greatly by its sale. He need only point the shareholders to such authorities as Sir William Preece and others, who, at the meeting of the British Association, had expressed the opinion that the gas industry was but in its infancy, and that in future one might look for still greater developments and improved prospects all round. He trusted these anticipations would prove correct. The report was unanimously adopted, and a dividend of 6 per cent. for the half year, free of income-tax, was declared.

Good Business and Thrift at Newport.

At the recent half-yearly meeting of the Newport (Mon.) Gas Company, under the presidency of Mr. R. Laybourne, J.P., the accounts for the six months ending the 30th of June showed a balance of £9887 on the profit and loss account; and the Directors recommended the payment of the statutory dividends. Appended to their report was the certificate of the Engineer (Alderman Thomas Canning, Assoc.M.Inst. C.E.) to the effect that the works were in a state of efficient repair, and in highly satisfactory order. The Chairman, in moving the adoption of the report and accounts, said that during the past half year the Company had sold 4¾ million cubic feet more gas than in the corresponding half of 1905, with an increase in income of £612. There was also a rise in the price of residuals. The balance carried from the revenue account to the profit and loss account was £7223; so that they were able to pay the statutory dividends without having recourse to the balance from last year. The shareholders would be pleased to know that the Thrift Society, which was rather a pet of the Board, was in an excellent condition. It had flourished beyond all expectations, and the Directors hoped that in the future it would be still more useful to the working men. During the half year one of the members had invested £100 in permanent securities from the accumulation of his small profit in the Thrift Society. This was in addition to the £500 previously invested by members of the Society. He believed the usefulness of the institution would become still more general. It had not been known what was meant by it. The workmen had been suspicions that if the Company tried to do something for them they did so for some specific object. But they had none except their benefit; and the working men were now beginning to see it. The motion was carried, and the statutory dividends were declared. The Secretary (Mr. T. H. Hazell) said he should like to thank the meeting for the approval and satisfaction shown at the state of the Company and the manner in which the accounts were put before them. The Engineer referred with pleasure to the way in which the Directors encouraged the officials in their work. He drew special attention to the interest taken by the Chairman, who, he said, at an advanced age brought all the juvenility of his early life into the work, and set all of them an example. Indeed, the desire of the whole Board had been to make the Company what it undoubtedly was—a satisfactory commercial and a thoroughly well-conducted concern. It was absolutely necessary for the Company to take steps to meet the enemy that was in the gate—an enemy which was not by any means so formidable as was thought years ago. It had proved not to be the enemy they anticipated at all. They were easy victors. He said without fear of contradiction that throughout the whole of England and other countries the incandescent gas-light was the one that was going to be the light of the future. Of course, it would mean that there would be a certain decrease in profits, so to speak, because they would sell less gas; but then they should think of the enormous advantage they were giving to the public. The question they had to consider was what they supplied the public with; and at the present time the Newport Gas Company was supplying a very cheap article. A hearty vote of thanks was accorded to the Chairman for presiding, and this concluded the proceedings.

Increased Town Supply at Tunbridge Wells.

As there were no accounts to present at the half-yearly meeting of the Tunbridge Wells Gas Company last Wednesday, the Chairman (Mr. W. H. Delves) could only give the shareholders a general idea as to the working of the undertaking in the six months ending the 30th of June. He was, however, in a position to state that it had been entirely satisfactory, and that the Directors had no hesitation in recommending that the usual full dividend should be paid on the various classes of stock. They had experienced a very gratifying increase in business; in fact, the augmentation in the gas sold had been nearly equal to 6 per cent. The Directors had entered into a new contract for coal at an advanced price, as they expected would be the case from the general state of the market. But the increase was not so large as they anticipated. More coal was carbonized during the half year under review than in the corresponding six months of 1905, and less oil had been used. Altogether, the price for carbonizing material was considered very satisfactory in comparison with last year. The produce of the coal was also satisfactory. They obtained more gas per ton, and this lessened the comparative price of coal per 1000 cubic feet of gas sold. About residuals, less could be said. It was a curious fact that while the price of coal was rising, it appeared to have no influence on the price of coke. Tar ruled about the same as last year; and in sulphate of ammonia, slightly better figures were shown. During the spring they sold the great bulk of it to Kentish fruit-growers at a satisfactory price. Gas-rentals had increased nearly £1000; the number of prepayment consumers going up. In fact, they were now quite a considerable proportion of the Company's customers. Public lighting was as nearly as possible the same as last year. Of course, they could not expect to increase in this direction. The proportion of public to private lighting was really very small—being only about 3 per cent.; but a few years ago it was 7 or 8 per cent. Their greatest progress had been in the town, which was a very healthy sign. In several parts they had enlarged the mains, where the consumption was overtaking their power to supply it; and so far as could be seen at present, it had been a good policy—the increased consumption in these particular districts being noticeable. He was glad to inform the shareholders that the Bill

removing the restrictions on gas companies with regard to sulphur compounds had received the Royal Assent. Of course, the Company would continue to take out the sulphur compounds from the gas as far as was possible; but they had not now the fear of fines if at any moment the parliamentary limit should be exceeded. In this respect their Engineer (Mr. Andrew Dougall, M.Inst.C.E.) would be relieved of anxiety. Interim dividends were declared at the rates of 12, 9½, and 9 per cent. per annum on the various stocks; and the proceedings closed with a vote of thanks to the Chairman.

A Good Half Year at York.

The report submitted at the half-yearly meeting of the York United Gaslight Company stated that the balance of revenue carried to profit and loss account amounted to £9394; and after the payment of the dividends, there was a surplus to carry forward of £857. During the six months, 425 yards of additional mains were laid, 358 meters were fixed for new consumers, and 599 additional cookers, 186 gas fires and boilers, and 2135 lights were fixed by the Company's own workmen, in addition to those supplied by other gas-fitters. After 52 years of faithful and efficient service, Mr. Matthew Leaf resigned his position as Secretary and Manager of the Company; and he has been elected to the seat on the Board rendered vacant by the death of Sir C. A. Milward. The Directors placed on record the following resolution, which they felt sure would meet with the cordial approval of the stockholders. "That the Board desire to record their high appreciation of the long and valuable services of Mr. Leaf, and their great regret that, by reason of the state of his health, he has found it necessary to resign his appointments." The Board have selected Mr. Sidney E. Stevenson to succeed Mr. Leaf as the Secretary and Manager. The Chairman (Mr. J. R. Hill), in moving the adoption of the report, said he thought it would be regarded with satisfaction, seeing that the Company paid the usual maximum dividend on their increased capital, and carried forward a substantial surplus. At the last half-yearly meeting, the Company created £35,000 of debenture stock with the view of paying off the mortgage loans of £30,900; and the stock had been successfully issued at a premium, and the mortgages discharged—leaving a sum of £4100 in hand available for capital requirements. The large applications which were received for this debenture stock appeared to indicate that it was regarded locally as a very desirable and safe security; and in connection with its issue he called attention to the fact that, besides the very ample value contained in the Company's freehold property, there was also the reserve fund, amounting at present to nearly £20,000, which was separately invested in first-class securities. He observed from the "Yorkshire Herald" that the city lighting authorities proposed a further extension of electric lighting in the city; and he thought it was worthy of note that the Chairman of the Streets and Buildings Committee, in dealing with the matter, said that in many towns it was considered lighting with incandescent gas was superior to electric lighting. As the Company were very large ratepayers, he (Mr. Hill) felt perfectly justified in referring to this; and he considered it to be unfortunate for the ratepayers that the Council did not pay more attention to the undoubted results arrived at in other large towns, where it had been conclusively proved that incandescent gas lighting was better and cheaper for the public streets than electricity. This had received remarkable confirmation within the last few weeks by a no less eminent authority than Sir William Preece, the expert electricity adviser to the Board of Trade, who, speaking at a meeting of the Carnarvon Harbour Trust, when a proposal to light the promenade by electricity was under discussion, strongly urged the Trustees to decide on incandescent gas. Since the last general meeting, important changes had taken place in the management of the Company. Death had removed Sir C. A. Milward, who had been a Director for upwards of eight years, and had rendered much valuable service to the Company. The resignation of Mr. Leaf was an event which the Board received with the greatest regret, as they so well knew the great value of his long experience and thorough practical knowledge of gas engineering and gas making, and they also knew and appreciated very highly his loyalty and devotion to the interests of the Company, which he had faithfully served for upwards of 52 years. The regret was, however, somewhat tempered with satisfaction, by reason of his acceptance of the vacant seat on the Board; and the Directors were gratified to know that the Company would still have the benefit of his advice and assistance. After careful inquiry and consideration, the Board selected Mr. Sidney E. Stevenson to succeed to Mr. Leaf's position as Secretary and Manager. Mr. Stevenson had had a long and varied experience as a Gas Manager and Engineer; and the Board had every reason to hope that he would manage their affairs efficiently and successfully. The report was adopted.

Street Lighting in Sheffield.—There is a proposal in Sheffield that the system of street lighting in Sheffield Moor, Pinstone Street, Fargate, and High Street, shall be changed from gas to electricity; the total annual charge to the Watch Committee for lighting and maintenance being £260. The Sub-Committee who have the matter in hand also recommend that the capital cost of the works and plant necessary to carry out such alterations be borne by the Electric Light Committee; and that the Tramways Committee pay an annual contribution to the Watch Committee of £30, which is half the difference between the cost of lighting by gas and by electricity.

Lighting of Birkdale and Ainsdale.—At the last meeting of the Birkdale Urban District Council, Mr. Pye drew attention to the improvement in the quality of gas supplied to Birkdale, as shown by the tests. While on the subject of gas, he suggested that, seeing that the Southport Corporation made a profit of £13,000 out of the consumers, it was time the charge was reduced. With regard to the overhauling of the lamps at Ainsdale, and the introduction of inverted fittings, he said the improvement was very marked. The conversion was not yet universal; but he hoped that the Council would see their way to let them have these lights all over the district before the end of the year. The rateable value of Ainsdale was increasing; and it warranted the extension of the improved lighting.

GLASGOW CORPORATION GAS SUPPLY.

Annual Report of the Gas Committee—Accounts for the Year.

The Thirty-Seventh Annual Report by the Committee on Gas Supply, which embraces the year from June 1, 1905, to May 31, 1906, was submitted at a meeting of the Corporation of Glasgow last Thursday—Lord Provost BILSLAND in the chair.

The Gas Committee reported as follows:

I.—FINANCE.

The gross revenue amounts to		£832,171
and the gross expenditure to	£634,362	
to which is added depreciation written off capital assets	58,342	
		692,605
The balance carried to profit and loss account being		£139,566
The Committee had to meet the following requirements during the year.		
(1) Annuities on stocks, so far as not redeemed and not converted	£22,822	
(2) Contribution to Corporation loans fund, in respect of Glasgow Coporation 3 per cent. stock redeemable in 1921, issued in lieu of converted gas annuities	8,263	
(3) Interest on borrowed money and redeemed loans	63,442	
(4) Sinking fund	43,275	
		137,802
Leaving a deficit on the year's operations of . . .		£1,764
This surplus carried to the balance at the credit of profit and loss account, carried from the previous year's account, viz.		21,025
makes the amount at the credit of that account .		£22,789
The Committee out of this have transferred in name of depreciation to premium account the sum of .		10,000
Leaving to be carried to the credit of next year's profit and loss account the balance of		£12,789

Tar and Liquor.—Your Committee regret that the market for residuals has not shown any improvement during the past year. The income for the past year has increased by £5922; but this is to be attributed to the increased quantity of coal carbonized—the average price received per ton of coal carbonized being 3s. 5·059d., as compared with 3s. 5·075d. for the previous year, or a decrease of 0·016d. per ton.

Coke.—Coke this year realized £12,583 more than the preceding year; this increase being due to the greater quantity sold and a better price having ruled. The quantity of coke sold during the year was 274,905 tons, as compared with 260,581 tons for the previous year; being an increase of 14,324 tons. The average price received was 6s. 5·04d. per ton, as compared with 6s. 0·26d. for the previous year; being an increase of 4·78d. per ton.

Coals.—Your Committee as usual advertised for tenders for coal to be supplied during the coming year, and have concluded contracts for almost the whole quantity required, but at prices considerably in advance of those of last year. The quantity of coal carbonized during the year was 712,097 tons, as compared with 680,235 tons for the preceding year—an increase of 31,862 tons.

Sinking Fund.—Your Committee applied £12,664 of the amount at the credit of the sinking fund to the extinction of £3690 of £9 per cent., and £1265 of £6 15s. per cent. gas annuity stocks; and the annuities formerly payable upon these stocks now cease to be a charge upon the revenue of the Department. There has also been redeemed during the year, by the application of moneys at the credit of the same fund, £4084 of Glasgow Corporation 3 per cent. stock, and a further amount of £17,125 of loans raised under the Glasgow Corporation (Tramways and General) Order Confirmation Act, 1901. The amount added to the sinking fund during the year was £57,399. The sinking fund, with its accumulations, now stands at £624,896, of which there has been already applied in the redemption of borrowed money, £3 per cent. stock and annuities, £551,798; leaving still available for either of these purposes the sum of £53,098.

Borrowing Powers.—As will be seen from the statement of loan capital, the borrowing powers of the Corporation were increased on Aug. 4 last by £1,000,000; but the rate per cent. for redemption purposes has been raised to 3 per cent. per annum. The amount borrowed during the year for capital purposes was £160,000.

Price of Gas.—Having regard to the result of the year's operations now recorded, and notwithstanding that contracts have been entered into for the supply of coal (the principal item of expenditure) at prices considerably in advance of those of last year, and that additional sinking fund to the extent of £4800 will require to be raised in respect of the loan obtained under the Glasgow Corporation Order Confirmation Act, 1905, your Committee recommend to the Corporation that the price to be charged for gas for the current year, as from the date of the last survey, be continued at the same rates as last year—viz: (1) Lighting and domestic purposes: Within the city and suburbs generally, 2s. 1d. per 1000 cubic feet; within the Milngavie area of supply, 3s. 1d. per 1000 cubic feet. (2) Motive power purposes: Within the city and suburbs generally, 1s. 9d. per 1000 cubic feet; within the Milngavie area of supply, 2s. 9d. per 1000 cubic feet. (3) Manufacturing purposes: For manufacturing purposes, other than for lighting and domestic purposes, within the city and suburbs generally, 1s. 9d. per 1000 cubic feet; within the Milngavie area of supply, 2s. 9d. per 1000 cubic feet. Where the supply of gas is given for manufacturing purposes, such supply shall be measured through a separate meter; and the minimum amount payable therefor annually

and in advance shall not be less than £3. (4) Supply through prepayment meters: 2s. 6d. per 1000 cubic feet.

Sale of Gas.—The following is a comparison of the sale of gas for the past year, as compared with the previous twelve months:

—	Rate per 1000 C. Ft.	Year 1904-5. Consumption.	Rate per 1000 C. Ft.	Year 1905-6. Consumption.
	s. d.	Cubic Feet.	s. d.	Cubic Feet.
I.—Within the city and suburbs generally:—				
(1) Lighting . . .	2 1	4,980,675,875	2 1	4,953,185,900
(2) Gas-engines . .	2 0	342,908,400	2 0	2,997,300
(3) Do. . .	—	—	1 9	351,454,700
(4) Manufacturing purposes . .	—	—	1 9	85,658,100
(5) Contract gas . .	2 1	477,168,520	2 1	527,302,550
II.—Within the Milngavie area:—				
(6) Lighting . . .	3 1	15,855,900	3 1	15,809,700
(7) Gas-engines . .	3 0	443,400	2 9	496,400
(8) Manufacturing purposes . .	—	—	2 9	743,100
(9) Contract gas . .	3 1	1,297,100	3 1	1,380,850
III.—Prepayment supply	3 4	3,121,125	2 6	40,908,433
		5,821,470,320		5,979,937,033
Used at works. . .		66,463,200		73,008,500
		5,887,933,520		6,052,945,533

The number of gas-engines in use, and the total horse-power, for the year and the preceding year, were as follows:—

	Number.	Horse Power.
May 31, 1905 . .	1,810	15,214⅞
May 31, 1906 . .	1,778	16,209⅜
Decrease .	32 = 1·22 p. ct.	Increase 994⅜ = 6·53 p. ct.

II.—Works.

The works and plant have been maintained in an efficient condition out of revenue during the year. The greatest quantity of gas sent out during the year in twenty-four hours was 34,259,000 cubic feet. The maximum daily make was 31,370,000 cubic feet. The quantity of gas per ton of coal carbonized was 9416 cubic feet, as compared with 9481 cubic feet for the previous year. The loss by unaccounted-for gas during the year was 9·72 per cent., as compared with 8·70 per cent. About 22 miles of new mains were laid during the year.

The number of meters in use on May 31, 1906, was 242,284; being an increase of 13,661 over the number in use at the same date last year. Of these additional meters, 11,100 were automatic or prepayment. During the year, 23,289 meters were repaired, and 12,612 were examined while in use, of which 10,915 were found in a satisfactory condition, and 1697 were found defective and removed. The number of gas-stoves on hire as at May 31, was 31,185. The number of gas heating and cooking apparatus sold during the year was 3519.

Debate in the Council.

Ex-Bailie Calderwood, the Convener of the Gas Committee, said he had great pleasure in submitting the report and balance-sheet. He thought they might congratulate themselves—the Committee especially—on the result of the past year. They would see that their gross revenue was £31,994 in excess of that of the preceding year. The net outcome was that they had a surplus of £1764. Some might say that this was not a very large sum, seeing that their revenue had been above £800,000; but so long as they could pay their liabilities, they did not want large surpluses. They brought forward from the preceding year £21,025; and with the addition of this £1764, they had carried to profit and loss account £22,789. This was a very large surplus to hold; and so the Committee, in their wisdom, thought it would be best to take £10,000 of it, and add it to the premium account. This premium account, of course, nobody could define, unless, probably, they were to say it was goodwill. It was a liability without an asset. The Committee regretted that, so far as tar and liquor were concerned, there had been no improvement in the market as to price. However, their accounts showed that during the year they had an increased income of £5922. This did not arise from any increase in price, but merely from the greater quantity of coal carbonized. They had carbonized more coal than in any previous year. The Committee had fixed contracts for almost the whole quantity of coal required for the ensuing year, but at a somewhat higher price. It was generally expected that there was to be a rise in the price of coal; and although the increase represented a very large sum, and would affect them considerably, at the same time they could not help themselves. They had sold a greater quantity of coke; and it had increased in price about 4⅜d. per ton. They had had a very large increase from this product, and he believed the year on which they had entered would show a better result than the past one. Altogether, their affairs were in a very sound condition. They had added £57,399 to the sinking fund, which at May 31 last amounted to £604,896. Of this, they applied £551,798 in redeeming mortgages, loans, annuities, and 3 per cent. Corporation stock; leaving £58,091 still available for these purposes. The amount written off capital assets, in the name of depreciation, out of revenue, amounted to £58,242, as compared with £36,199—an increase of £22,043. In addition, £10,000 had been written off, in lieu of depreciation, out of the profit and loss account. He was very glad to think that the year they had passed through had been so successful. They were looking forward to the future with great hope; and while at the beginning of this year they had to meet an increase in the price of coal, and also the extra £4800 which they had to pay in respect of the £160,000 that they had borrowed out of the £1,000,000 authorized in 1905, they thought it was not at all desirable that they should increase the price of gas, but that it should remain at the same rate as last year. Works repairs had been paid for out of revenue, and everything was in a very satisfactory condition. There had been of late years a great increase in the quantity of gas taken out of every ton of coal carbonized. He thought the Council should know this, because it had been a great source of income for the Gas Department; and it arose from this, that all concerned—Station Managers and others—appeared to take a very lively interest in their work, and the good results which flowed from this were the results of that good intention. The whole thing was before them. He had great pleasure in moving the adoption of the report and balance-sheet.

Mr. J. Willoch seconded. He said the statement laid before them was a most important one for the Council. Three years ago they reduced the price of gas by 3d. per 1000 cubic feet. This meant a drop of £70,000 a year in the revenue. Since then they had been struggling on, and they had been able to pay their way without raising the price of gas. This last year they had done better. Their Engineer and Manager had been most successful in introducing the prepayment meter. As many as 11,000 of these were issued last year; and 75 per cent. of the people who got them had not used gas before. It was not like replacing an old meter with a prepayment meter. This had helped them very substantially; and it was most interesting to note this, that while they might think that these people would be the poorest of the poor—well, if they were, they seemed to consume a considerable quantity of gas, because they found that the sums drawn from these meters were as high as £2 10s., £2 15s., and £2 18s., showing that they were not the poorest of the poor. These meters really met a want of the community. Another matter was the quantity of gas sold per ton of coal carbonized. During the three years 1901-2-3, the average was 8075 cubic feet; last year it was 8501 cubic feet—an increase of 426 feet. The quantity of coal carbonized was 712,097 tons, and this gave an extra quantity of gas produced of 303,312,000 cubic feet, or in value, at 1s. 9d. per 1000 cubic feet, equal to £26,500. This was most satisfactory. He wished to put before them the value of the capital they had expended upon the gas undertaking, for every 1000 cubic feet of gas sold. Although it was up 1s. 9d. per 1000 cubic feet since they erected the Provan works, it still stood at 7s. 9d. In Edinburgh and Leith, it stood at 15s. 8d.; in Aberdeen, at 17s.; and in Bradford, at 12s. There were one or two places in which the rate was lower by a few pence—such as Rochester and Sheffield.

Treasurer D. M. Stevenson said that he intended to ask that his dissent be recorded against the method of stating the accounts; but he saw in the minutes of the Gas Committee that a Committee had been appointed to deal with this subject. He wished to point out that the premium account, to which £10,000 had been added, was simply a book entry. Why the Auditors had agreed to it was a mystery. They had forced upon them, by Act of Parliament, a provision for the sinking fund of 1½ per cent., to deal with the market value of the annuities. In addition to this, the Auditors had agreed to a further sum of £10,000 being set apart. This meant that, in the course of fifteen or more years, this amount would disappear. But every manager of a corporation undertaking knew that there was no need for a premium account—that there was no need to have a sum in name of goodwill. If anyone would take the trouble to look into the matter, he would find that the total expenditure on works had been written down practically £2,000,000; and therefore he thought the Council would agree that the wise course was not to carry on a mere book entry, but rather to get at some way of stating the accounts which would show that the works and plant they possessed were not only of the value shown in the books, but probably a great deal higher.

Mr. A. B. Kirkpatrick thought that a further premium of £10,000 was entirely wrong. It seemed to him that it was as clearly depreciation as anything could be. He hoped the Committee appointed to deal with it would not make the mistake of attempting to reduce the whole of the annuities, as was done a few years ago, when people were asked to take 1901 stock in place of their holdings of annuity stock. He would suggest to the Committee that a more simple way of getting rid of the annuities would be to issue to the holders of them a similar security, in irredeemable 3½ per cent. stock; and he had not the least doubt that everybody would take the stock.

Mr. J. Battersby asked about the gas unaccounted for. It amounted to something like 652,000,000 million cubic feet—about 9 per cent. He supposed the cost of this would be £60,000 or £70,000. It seemed to him to be a very great quantity, and to be one of the causes which prevented people getting gas at a cheaper rate than at the present time. He had been expecting—and he supposed many more had been expecting—that they were going to get gas exceedingly cheap. It had come down in quality during the years they had had the gas. On looking over the accounts of the Coatbridge Gas Company, for instance, the other day, he found that they were supplying gas at 2s. per 1000 cubic feet, and for motive power purposes at 1s. 7d., against 2s. 1d. and 1s. 9d. in Glasgow, and that after declaring a dividend at the rate of 11 per cent. on the old shares, and of £7 14s. per cent. upon the new shares. How they could do this and give a cheaper gas he was at a loss to divine. The carriage of coal could not account for it (Coatbridge was not very much nearer coalfields than Glasgow); and with the large consumption they had, he thought they should be able to command a lower figure. These were facts they ought to consider; and while they could not blame the Gas Convener, he thought these matters required to be ventilated, in order to see if there were something awanting. They ought to have gas at a cheaper rate than they had. There was one reason—and a very heavy reason it was—which hung like a millstone round their neck, which was the annuities that their forebears unfortunately pledged them to. Probably this accounted for 1½d. or 2d. per 1000 cubic feet; but still he thought that, with the large opportunites they had for producing gas, it ought to be got cheaper.

Mr. H. Alexander said they had obtained nearly 5d. per ton more for coke; but if it had not been for the enormous quantity which was produced, they might have had a loss of £4000, instead of a profit. In these circumstances it was hardly reasonable to look for cheap gas. The burden round their neck was being removed by the sinking fund. He therefore could not associate himself with the remarks made by

Mr. Battersby. He thought the 1¼ per cent. depreciation on the gas-works was not sufficient. The curious thing was that the Gas Committee did not write depreciation off the original value of the buildings or plant, or anything else; they took it off the depreciated value, so that 1¼ per cent. would never depreciate them altogether. The sooner they had some rational method of stating this matter the better. He considered the outstanding feature of the whole report was the very splendid work which had been done by the Managers. It was quite evident that the Convener, and everyone associated with him, and the General Manager, were doing their very utmost for the Corporation. Three years ago they had a balance of upwards of £30,000. For the past two years they had really had a loss; and they had drawn from the balance till it was now standing at £12,789.

Mr. J. M'FARLANE could not associate himself with Mr. Kirkpatrick as to the issue of irredeemable stock. He did not think that a private company in Coatbridge should be taken into account with themselves. They in Glasgow could make a dividend out of their depreciation and sinking funds. The two cases were not on a par. The question of the excessive waste of gas had been raised. He thought it said a great deal for Mr. Wilson, and for Mr. Foulis, that in a city like this, where such an enormous pressure was put upon the pipes, the loss of gas was so small. He could remember when 11 per cent. was considered a very fair allowance. When they took over the Maryhill Gas-Works, the loss there was no less than 20 per cent. When they could escape with 9 per cent.—and this represented the loss by fire and other matters for which they were not paid—he thought they might congratulate themselves upon the result. It was considered that in removing the gas-works to Provan, a large amount would be saved in labour. This had been realized. On account of the heavy expenditure there they had a depreciation, for the first time, of about £10,000. On the other hand, through loss of profit last year, their rates had decreased by somewhere about £10,000. On the other hand, again, the stoves account seemed to have got the benefit of these circumstances. This account seemed, year after year, simply to stand still. The cost of putting in stoves, and removing them, at very short intervals, was so great that it almost ate up the entire revenue they got from them. On the other side of the account, they found that they had depreciated stoves about £10,000. It ought to be taken note of that the running of the stoves cost them £14,000. He had no doubt, however, that the sale of gas they got from them counterbalanced any loss. A new item had been introduced into the accounts, in the sinking fund for annuities, amounting to £11,000. He wished to call attention to the appointment of a Committee to consider the form and shape of the accounts. They had the very same Auditors in the Gas and Water Departments; but the accounts were differently stated. Some years ago they paid a fee of 1000 guineas to an eminent professional gentleman to advise them as to the putting of their accounts on a uniform basis. This had not been done; but he hoped that the Committee which had been appointed would see to it.

Bailie FORSYTH said the gas produced was of about 19-candle power. He was led to understand that from a lower candle power they were going to have a very cheap gas; and he would like to know if a lower candle power was to be introduced.

Mr. J. H. MARTIN wanted to know why they charged 2s. 6d. per 1000 cubic feet for gas supplied through prepayment meters.

Mr. M. W. MONTGOMERY, the Sub-Convener of the Gas Committee, pointed out that, in the case of prepayment meters, special attention was required, and the meters were more costly. As to the extra £10,000 of sinking fund, they were compelled by Act of Parliament to provide this. Unaccounted-for gas had, fortunately, been decreasing of late, and the reason it was so large was simply this, that a great deal of gas was lost in making connections, also in condensation in its passage from the works to the consumers.

Bailie P. G. STEWART, as a member of the Gas Committee, did not think they were entitled to charge those using prepayment meters such a high rate as they did. It might be a matter for the Committee to consider whether they could not come nearer to the ordinary price than 2s. 6d.

Ex-Bailie CALDERWOOD, in closing the discussion, said he had no reason at all to complain of the criticisms which had been made on the accounts. The Committee did not want to reduce the illuminating power of the gas down to what their Act of Parliament allowed, all of a sudden. To reduce to 16 candles would be too great a discrepancy, and the Committee thought the best way would be to do it gradually. It would come down to 16 candles by and by.

The report and accounts were then adopted; and on the motion of Ex-Bailie CALDERWOOD, the Auditors—Messrs. Kerr, Anderson, and Macleod, of Glasgow—were re-elected.

Accounts of the Department.

The Committee reported that they had agreed to remit to a Sub-Committee to consider and report as to (*a*) improving the form of stating the assets and liabilities of the Gas Department, (*b*) the principle on which depreciation on the various assets of the department ought to be calculated, (*c*) the desirability of continuing the "premium account" which has been opened in connection with the conversion of gas annuities; and to make recommendations thereanent.

The accounts show that of the original 9 per cent. annuity stock of £300,000, upon which £27,000 of annuities were payable, £69,152 10s. has been converted into £3 per cent. stock, redeemable in 1921, and £36,158 15s. has been redeemed out of sinking fund—leaving the stock at £194,688; and of the 6¾ per cent. annuity stock of £115,000, upon which £7762 10s. of annuities were payable, £28,805 has been converted, and £13,105 redeemed—leaving £73,090 of stock. The annuities payable have been reduced by these operations from £34,762 10s. to £22,455 11s. Of Glasgow Corporation 3 per cent. stock, amounting to £272,268, there has been redeemed out of sinking fund £16,294—leaving £255,974. The loan capital authorized amounted to £4,200,000, of which £1,400,000 was for electricity purposes. There has been borrowed £3,360,000; leaving to be borrowed for gas purposes £840,000. The sums redeemed amount to £457,928, of which £105,993 relate to the Electricity Department. The amount of loan capital remaining amounts to £2,902,071. The year's capital expenditure amounted to £112,854. Of this sum £355 was applicable to the Dawsholm station and works; £2497 to the Tradeston station and works; £45,278 to the Provan station and works; £872 to workshops in Stirling Street; £98 to chemical works at Dawsholm; £5931 to chemical works at Provan; £22,936 to pipes and cost of laying; £27,403 to gas-meters; and £16,173 to gas-stoves. The outlay upon works has been about £3,770,000; but various properties have been sold, and deducting the prices received and £1,292,474, by which the works have been depreciated, they stand in the books of the department at £2,464,409. Taking one or two of these, it is found that the expenditure on the Dalmarnock station and works was £257,708; there have been sold properties to the amount of £17,666, and depreciated £180,118. The works being now closed, there was no capital expenditure upon them during the past year, and they now stand in the books at £59,924. The Dawsholm station and works have been similarly reduced from £562,611 to £282,244; the Tradeston station and works from £340,821 to £177,219; the Temple station and works from £233,573 to £167,715; the Provan station and works from £777,360 to £752,175; pipes and cost of laying from £809,298 to £477,577; meters from £498,937 to £206,125; and stoves from £129,627 to £53,148.

Of the total revenue of £832,171, which was £31,994 more than in the previous year, there was derived from the sale of gas £613,632—£11,445 increase; from coke, £80,380—an increase of £12,588; from ammoniacal liquor and tar, £124,171—an increase of £5922; from waste lime, £574—an increase of £140; and from hire of stoves, £8812—an increase of £1028.

On the expenditure side, coal (712,097 tons) cost £341,366—a decrease of £7230; purifying materials, and oil, water, and sundries, cost £32,533—an increase of £426; salaries of Engineers, Superintendents, and Officers at works came to £4786—an increase of £104; workmen's wages amounted to £75,390—a decrease of £10,481; repairs and maintenance of works and plant cost £58,582—an increase of £11,739; and the carting and stabling account amounted to £2671—a decrease of £3424. The total charge for the manufacture of gas was £515,329—a decrease of £8866. For the distribution of gas, the salaries of the Surveyor, inspectors of meters, and clerks in the survey room amounted to £14,620—an increase of £746; repair, maintenance, and renewal of mains and service pipes, including materials and laying, amounted to £31,889—a decrease of £843; and repairing and fixing meters cost £17,484—a decrease of £72. The total cost of the distribution of gas was £64,723—a decrease of £969. Expenses chargeable to repairs of stoves amounted to £8166—an increase of £700. Rents and feu-duties amounted to £8367—a decrease of £117; and rates, assessments, and taxes amounted to £22,777—a decrease of £9417. Management cost £12,578—a decrease of £492: law and parliamentary charges amounted to £877—an increase of £669; and retiring allowances amounted to £1545—an increase of £250. The total expenditure amounted to £634,362—a decrease of £8756. Depreciation written off during the year amounted to £58,242, and was made up of: Works at 1¼ per cent., £20,215—an increase of £10,149; pipes, at 2½ per cent., £11,740—an increase of £6127; meters, at 6 per cent., £11,431—an increase of £308; stoves, at 10 per cent., £5249—an increase of £210; and further on stoves (a new entry), at 10 per cent., £5249; and on the premium account, £4358—the same as in the previous year. Adding to the total expenditure of £634,362 the depreciation of £58,243, the sum brought out is £692,605, which leaves £139,566 to profit and loss account. The disposal of this sum is described in the report of the Committee.

The statement of gas made, sold, &c., shows that the make at Provan was 1,941,913,000 cubic feet; at Dawsholm, 2,781,752,000 cubic feet; at Tradeston, 1,980,879,000 cubic feet; and at Temple, 347,000 cubic feet—a total of 6,704,891,000 cubic feet, and an increase upon the previous year of 255,352,000 cubic feet. The total quantity sold or accounted for was 6,052,945,533 cubic feet—an increase of 165,012,013 cubic feet. Unaccounted-for gas amounted to 651,945,467 cubic feet—an increase of 90,339,987. The percentage of unaccounted-for gas was 9·723, as compared with 8·708; but in the year preceding that it was 11·245 per cent. The yield of gas per ton of coal carbonized was 9416 cubic feet, as compared with 9481 cubic feet; and the quantity sold per ton of coal carbonized was 8501, compared with 8656 cubic feet.

The Beginning of Municipal Gas Supply in Halifax.

The following extract from the "Halifax Courier" for Aug. 9, 1856, recording proceedings in the Town Council relating to the transfer of the gas-works to the Corporation, was reproduced in the "Halifax Evening Courier" last Thursday: The Town Clerk (Mr. Wavell) read a report as to the taking over of the gas-works. It was resolved, on the motion of Mr. Councillor Crook, seconded by Mr. Councillor Green—"That the report of the General Purposes Committee now read be received and entered into the report-book, and that a copy of the consent of the General Board of Health for the borrowing of £37,500 upon mortgage of the gas-works, gas rates, and general district rates, be entered upon the minutes of the Council." It was likewise resolved, on the motion of Mr. Swale, seconded by Mr. Councillor Bancroft—"That the title-deeds relating to the gas-works be deposited in the hands of the Mayor, the ex-Mayor, Mr. Alderman Crossley. Mr. Alderman Whitworth, and Mr. Alderman Riley, as a security for the £37,500 raised by them for the purchase of the gas-works." Mr. Alderman Walsh then moved the following resolution: "That the following nine members of the Council—viz., the Worshipful the Mayor, Aldermen James Riley, Samuel Waterhouse, John Whitworth, and John Wright Child, and Councillors Thomas Bentley, Joseph Wood, Adam Battinson, and Joseph Sugden, four of whom to form a quorum—be the Gas-Works Committee." Mr. Councillor Cockerham seconded the motion, which was carried unanimously after Mr. Councillor Ramsden had been added to the Committee.

Self-Intensified Gas Lighting in Newcastle-on-Tyne.—The Town Improvement Committee of the Newcastle Corporation have arranged with the Newcastle and Gateshead Gas Company for the substitution for the old gas-lamps in parts of Grainger Street and Market Street, around the Central Exchange Buildings, of self-intensifying lamps, similar to those in use in Grey Street.

GAS AND ELECTRICITY SUPPLY AT BURTON.

The abstract of the accounts of the Burton-on-Trent Corporation for the year ending the 31st of March last has just been issued by the Borough Treasurer (Mr. Oswald W. Arnold). The assets stand at £1,242,696, while the liabilities are £724,753; showing a surplus of £517,943. The outstanding debt of the borough at the date named was £682,542, towards the redemption of which £36,495 is available. During the year mortgages were paid off to the amount of £7905, and £20,395 worth of stock was cancelled at a cost of £18,787. The average rate of interest paid on the fixed debt was £3 6s. 9d. per cent. The rateable value of the borough now stands at £339,700; and the leakage in the collection of the rate was only 1·58 per cent. for the year.

There are two remunerative undertakings in the hands of the Corporation, of which Mr. F. L. Ramsden has charge. The first is the gas-works, the revenue account of which reveals a net profit of £7863 for the year. After providing £9562 for interest and repayment of loan, and carrying forward £1708 to the deterioration fund, a sum of £6500 out of the profit has gone to the relief of the rates; and the remainder is carried to the reserve, which at the end of the financial year stood at £13,484, being £1319 more than before. The gas-works deterioration fund now stands at £11,291; being an addition of £1708. A sum of £1540 was spent on capital account during the year, including £562 in extensions of mains and services, and £886 in prepayment meters and fittings. The next of the remunerative undertakings is the Electricity Department, the revenue account of which reveals a surplus of £1073, being an increase of £412 compared with the year 1904-5. This amount has been carried to the renewals account, which now stands at £753, after payment of £679 for Bennis stokers and water-softening plant, which will be refunded. The sinking fund reserve fund stands at £303. A sum of £5185 was spent on capital account, including £3258 for machinery, £528 for mains and services, and the amount already mentioned for the stokers and water-softening plant.

PAISLEY CORPORATION GAS UNDERTAKING.

A Successful Year—Disposal of the Gas Surplus.

At the Budget Meeting of the Corporation of Paisley held recently (Provost Eadie in the chair), Treasurer Muir M'Kean submitted the annual accounts of the various departments. Dealing with those of the gas undertaking, he said it was perhaps the most successful of all their trusts. The loan capital employed was only £94,000; and the gas made and accounted for last year was 399 million cubic feet—an increase of 29 millions over the previous twelve months. In the recent inquiry by the Sheriff at the instance of the Scottish Office, in connection with the application for further borrowing powers, a most interesting table was produced. It was compiled from the Board of Trade returns relating to gas-works owned by local authorities. It embraced twelve towns ranging in size from Perth to Dundee; and the average make of gas for each was 393 million cubic feet—almost identical with their own. The average authorized capital per million cubic feet sold worked out at £916. If this sum were multiplied by their sale of 399 million cubic feet, it would justify a capital for their works of over £365,000. From this sum deduct their present liability of £94,000, and it appears that, on the average experience of these twelve local authorities, they would be justified in having £260,000 additional capital. As a matter of fact, their Gas Engineer calculated that if they had to build and equip their works now, the lowest cost would be £337,500. These figures were more than borne out by another table showing that in the case of fifteen gas-works transferred to local authorities by actual sale, the average price paid per million cubic feet of gas sold was £1188. On this basis, Paisley Gas-Works were worth £474,000. These several totals included the value of mains and pipes. The question of depreciation had not been ignored by them. They had got the approval of Parliament to a clause authorizing them to set aside a sum of not less than 2 per cent. of the gross revenue received in each year in respect of their gas undertaking as a contingency and depreciation of works fund. Though they were not bound to do so, this provision for depreciation had been given effect to in the present accounts, and a sum of £1137 debited to net revenue. During several successive years, the gas consumers had derived great advantages in the reduction of price, abolition of meter hire, and charges for stoves and cookers. In the past financial year, 443 stoves, 564 range plates, and 1154 grillers had been fixed. These accounted for part of the increased demand for gas. He did not think it would be wise to make a further general reduction in price; but as it was desirable to induce a greater demand for motive power and manufacturing purposes, and as these did not participate in the concessions made last year, he proposed that they should reduce the charge for them by 1½d. per 1000 cubic feet. There were indications that a much larger trade would be done, especially for power; and with such keen competition from electricity, suction gas, &c., and more especially as the purposes mentioned meant a larger day consumption, they must see that the Gas Department were not handicapped in the race. A year soon passed; and should they succeed in getting more favourable contracts for coal next summer, there was reason to anticipate a further reduction in price to domestic consumers. Their Gas Engineer, Mr. Hislop, had taken an honourable place in the application of science to gas making; and he had the valuable assistance of Mr. Nisbet in supervising the works.

Bailie Robertson, in seconding the adoption of the accounts, said that the statement made by the Treasurer, that the value of the gas-works would justify a loan capital of £365,000, would come as a surprise to the community. The difference between the actual loan capital and the loan capital they would be entitled to borrow was something like £281,000. This difference to his mind was practically depreciation. One might say, and with reason, that writing off depreciation might now be discontinued, as the works stood at almost breaking up value; but the Treasurer had provided for further depreciation. He agreed with him that no reduction should be made in the price of gas this year. They were face to face with an increased price for coal, and a smaller revenue from residuals. Then, he entirely agreed with the proposal that a reserve fund should be accumulated, so that the undertaking could be carried on without requiring to borrow from the Bank at any time of the year. The proposal of the Treasurer was to transfer £1000 of the surplus on the gas account to the Public Health Department, £700 to the public baths, £300 to the public library, and £800 to town improvement—£2800 in all, out of £4000. Ex-Bailie Glover was well satisfied with the assessments, with the exception of that of the gas. This was a business, and not an assessment. He went back to last year, and he saw that £1000 had been put down for the public health, which assessment was equal on landlord and tenant. They made a present last year to the landlords of £500. They were going to do the same this year. He held it was not fair to the gas consumers to do anything of the kind. He proposed that the statement, as submitted, be adopted, with the exception of the gas, which should be 2s. 3d. per 1000 cubic feet, instead of 2s. 4d. as last year. Bailie Dougall suggested that the reduction should be 2d. per 1000 cubic feet. Mr. Stewart seconded Ex-Bailie Glover's motion. He admitted that everyone was interested in the public health, and for this reason contended that everyone ought to pay for it. It would be better to make a direct tax, and reduce the price of gas. Even to small consumers the reduced charge would be a benefit that would more than meet the additional health rate. Ex-Bailie Fisher supported the Treasurer; his reason being that it was quite customary for corporations to use gas surpluses, and Paisley was not the only town in Great Britain that was doing it. Ex-Bailie Dr. Russell could not agree with the distinction that Councillor Stewart had drawn with regard to those who would benefit from the gas surplus. He thought it was quite proper that a share of the gas surplus should be devoted to that most important trust.

Treasurer M'Kean having replied on the discussion, the Treasurer's motion was adopted by eleven votes to five.

GOOLE GAS AND WATER UNDERTAKINGS.

Annual Report—Substantial Profit.

The annual report and statement of accounts in reference to the gas and water undertakings of the Goole Urban District Council prepared by the Clerk and Accountant (Mr. James W. Johnson, F.C.I.S.) came up for final consideration at last Wednesday's meeting of the Council. The report, which had previously been discussed in Committee, shows an eminently satisfactory state of affairs.

In the gas revenue account, it appears that the total income of the department for the year to March 31 was £12,796—an increase of £1171 over the preceding twelve months. The principal source of income was the sale of gas to private consumers. No less than 54,720,100 cubic feet were disposed of for £8292 7s.—an increased consumption of 7,430,100 cubic feet, and £1212 19s. 7d. additional revenue. A sum of £1726 was derived from public lighting, being an increase of £26; and residuals realized £2300—a slight decrease owing to the reduced price obtainable for coke and tar. There was, however, a considerable increase of income from ammoniacal liquor—£614, compared with £479. On the other side of the account, there was expenditure amounting to £5100; leaving a sum of £7696 to be transferred to the profit and loss account. The expenditure was £254 more than the year 1904-5; there being £130 increase in the coal account, and £114 more in repairs of different kinds. The gross profit transferred to the profit and loss is £917 greater than last year, made up of £1171 increased revenue less £254 additional expenditure.

So far as the water account is concerned, the total income is £3512—an increase of £134 compared with the preceding year. This is made up of £208 increase in water-rentals, with £74 decrease in other departments. The expenditure is £679; leaving £2833 to transfer to the profit and loss account. This is £260 more than last year.

With £7696 derived from the gas revenue, and £2833 from the water revenue, and £133 received by way of interest, the total of the profit and loss account is £10,662. Against this is charged £131 for rents, £1212 for rates, taxes, income-tax, &c.; £696 18s. 11d. for management, £36 spent on behalf of the electric lighting scheme, and smaller amounts which bring the total expenditure up to £2080; leaving a gross profit on the two undertakings of £8582. The amount expended on the repayment of principal and interest on loans is £6629; leaving a net profit on the year's working of £1953.

A year ago the amount of accumulated net profits brought forward was £3088; and during the year the Council transferred £888 to the general account in relief of the rates—leaving £2200 accumulated profits. The balance of the last year's working brings the accumulated profits up to £4153. The statement of gas and water loans shows that the amount owing on March 31 last was £106,884.

Mr. Johnson closes his report with the following remarks: "As directed by the Council, the division of the Gas and Water Department will apply as from April 1, 1906; and the Council can safely accept the fact that, in relation to the management, the same is absolutely run throughout on commercial lines as a municipal undertaking, being a very healthy administrative branch from all commercial standpoints. The development and progress of the department are evident from a practical consideration of the figures given and included in this report. In conclusion, I may say that any investigation would reveal the truth as it is, that no better organized municipal gas and water undertaking exists in the country, nor one which is worked throughout, in all its branches, on more economical lines."

When the report and accounts came before the Council, very favourable comments were made upon them, which must have been exceedingly gratifying to the Engineer and Manager (Mr. T. G. Franklin).

Sale of Gas Stock.—At Gloucester recently, Messrs. Bruton, Knowles, and Co. sold by auction £1200 of 5 per cent. consolidated ordinary stock in the Gloucester Gas Company. The stock was submitted in £100 lots; and the prices realized were from £117 to £118 per lot.

PRICE OF GAS AT OLDHAM.

It will be remembered that some weeks ago recommendations of the Oldham Gas Committee with regard to reductions in the price of gas were referred back by the Council, in order that the Committee should further consider the possibility of making some larger concession to the smaller consumers.

At the last monthly meeting of the Town Council, Mr. Thompson, in moving the adoption of the minutes of the Committee, pointed out that at the previous meeting of the Council a scheme was submitted for a reduction in the price of gas. It was referred back; and he would like to explain the results. The members of the Gas Committee were most anxious to fall in with the desire of the majority of the Council to make a further reduction. He was sorry to say, however, that, after looking all the facts in the face, the Committee were unable to make any further concessions than were proposed before. The Committee thought the suggestions made were the most equitable possible, in view of the financial position of the department. Numerous and large claims were made on the profits of the Committee for the year. In the first place, the Council had expressed a desire that small consumers should be conceded 1d. per 1000 cubic feet. Again, the consumers who had gas-engines working for manufacturing purposes sent a deputation to the Committee. They would not be satisfied with any small reduction. They asked for a reduction of 1s., or some other substantial sum. Then the out-townships sent a very strong request for a reduction in the charge made for public lamps. Some of them went so far as to say they were entitled to have gas free in the public lamps, seeing that they were such good customers and that the Committee were making such large profits. The Gas Committee thought the main cause of the increase in the profits last year was the improvement of the plant for manufacturing and the higher price received for residuals —not the increased quantity of gas consumed. It was impossible to meet all the demands that had been made. What the Committee proposed was that up to 100,000 cubic feet a reduction of 1d. on the previous price be made, lowering it to 2s. 2d. net; for over 100,000 and under 500,000 cubic feet, the charge would be 2s. 1d.; over 500,000 and under 1,000,000 feet, 2s.; over 1,000,000 and under 5,000,000 feet, 1s. 11d.; and 5,000,000 cubic feet and upwards, 1s. 9d. This would be the net price after deducting discount. The charge for gas used for lighting the public lamps would be reduced by 4d. per 1000 feet. By these reductions, the Committee would lose £8930. He held that, on the whole, the gas consumers would be in a favourable position, both for domestic and manufacturing purposes. With the exception of Sheffield, Widnes, and a few other places where special circumstances prevailed, the price of Oldham gas would compare very favourably with most other towns.

The minutes were agreed to.

ACCIDENTAL POISONING BY GAS AT EASTBOURNE.

The Dangers of Water-Slide Chandeliers.

On Monday last week, Dr. G. VERE BENSON, the Coroner for East Sussex, held an inquest, at the Town Hall, Eastbourne, on the body of Mr. Ichymi Sugitachi, a Japanese gentleman, who arrived in the town on the preceding Saturday, and was found dead in his room at a boarding-house next day.

Two friends of the deceased having given evidence to the effect that he was 31 years of age, was one of the Secretaries at the Japanese Consulate in London, was at Eastbourne for his holidays, and when they last saw him was in good health and spirits,

Mr. *D. A. Stonehewer*, the proprietor of the boarding-house, said he thought he saw deceased in the smoking-room about eleven o'clock on the night of his arrival. He slept in the front room on the second floor; and it was noticed that he did not reply when called on Sunday morning. As he did not come down to the midday meal, witness went up to the room and found it was locked. Effecting an entrance from the balcony of the next house, he was nearly overpowered by gas, and saw deceased lying upon the bed. He immediately sent for a doctor and the police. The chandelier was a sliding one; but he never put water into it. The room had been occupied on and off since Easter till the previous Thursday. He was in it a few hours before deceased arrived, and there was no indication of an escape of gas. When he discovered deceased on Sunday, the chandelier had been pulled down almost to the level of the foot of the bed; indeed, it had been overpulled. He supposed deceased (who was less than 5 feet in height) wanted to light the gas. This was the only room in the house in which there was a chandelier; all the others had gas-brackets. The three taps were all turned off, and his idea was that the gas was escaping from the cup.

Mr. *J. W. Hobbs*, a gas-fitter, said the chandelier was a water-slide one, of which there were a good many in use, though they were being done away with as fast as possible. They should be watered two or three times a year; otherwise the gas escaped and filled the room.

The CORONER: In this case, it does not appear to have had any water for years.

Witness said the dust generally formed a sort of incrustation or joint; but when the chandelier was pulled down, this would break at once.

Dr. *Robert Howle* said he saw the body of the deceased about half-past three the previous day. There was a very strong smell of gas in the room in which he was found; the chandelier having been drawn down past the safety point. Life had been extinct from eight to ten hours. He had made an examination of the body, and found upon it and the thighs red spots indicative of poisoning by coal gas. The escape of gas would not cause a person to call for assistance.

The Jury returned a verdict to the effect that deceased was found dead in bed; that the cause of death was poisoning by coal gas, which had escaped from a gasalier of the water-slide type which had gone dry and had been pulled down inadvertently by deceased in ignorance of its construction; and that death was due to misadventure.

PUBLIC LIGHTING OF GODALMING.

Electricity to Remain in Use.

The Highways and Lighting Committee of the Godalming Town Council have been considering the question of street lighting. The present contract with the Urban Electric Supply Company is for ten years, from July 1, 1902, with power, however, for the Corporation to determine the contract at the end of five or seven years, on giving six months' previous notice. If the Corporation wish to take advantage of this power, they must give notice to the Company before Jan. 1 next. In order to help the Council to decide whether any advantage would be gained by determining the contract, the Committee invited both the Electric Light Company and the Gas Company to submit fresh prices. Working out the figures quoted by the Electric Light Company on the basis of the present number of lamps, the Company's tender is £30 less than that in force at present—namely, £844, as against £874. In addition to this, the Company state that their new offer includes a considerable increase in the candle power; the approximate candle power under the new tender, according to the Company, being 10 arc lamps, 27,000 candles; 110 70-candle lamps, 7700 candles; 130 25-candle lamps, 3250 candles; total, 37,950 candles. The Gas Company's tender works out at £786 per annum; and the Company state that the illuminating power will be from 20,000 to 23,000 candle power; also that the light given by a No. 3 Kern burner (presumably the burner referred to in the second part of their offer) will be considerably more than that given by the existing 50-candle power electric lamp, and the light given by the proposed high-pressure gas-lamps superior to that furnished by the present electric arc lamps; and being nearer the road's surface, they will give a more effective illumination. In both cases the tenders are for a five-years' contract.

In view of the facts that the candle power offered by the Electric Light Company is greater than that under the Gas Company's scheme, and that if the latter offer is accepted a great disturbance of the public streets would occur in order to make the necessary connections, the Committee were of opinion that the tender of the Electric Light Company should be accepted. They therefore recommended that notice be given to the Urban Electric Supply Company to determine the existing contract for street lighting, as from July 1, 1907, and that their fresh offer should be accepted; and the Council have agreed to this course.

WOKING PUBLIC LIGHTING.

Renewal of the Gas Company's Contract.

At the Meeting last Wednesday of the Woking Urban District Council, the Fire Brigade and Lighting Committee reported that the Gas Company offered to extend their mains to Old Woking and Brookwood forthwith, upon these conditions: (1) That the contract for public lighting be extended for seven years. (2) That the following prices be paid for lighting, maintenance, &c., all the year round, from one hour after sunset to 2 a.m.: 60-candle lamps £3, 80-candle single lamps £3 10s. 9d., 80-candle double lamps £6, and for lamps lighted all night (from one hour after sunset until one hour before sunrise), 80-candle single lamps £5, 80-candle double lamps £8 12s.; the prices to take effect on completion of the existing contract. (3) The agreement to be drawn up at once, and to be sealed by the Company and Council respectively, but to take effect only on the termination of the present agreement. The Committee said they had considered the question of street lighting by gas or electricity; but, as the gas supplied up to the present had been satisfactory, they were of opinion that the street lighting by incandescent gas should be continued. The Surveyor reported that each oil-lamp converted into a gas-lamp would save the Council about 10s. per lamp per annum, and that the cost of renewing gas-lamps was less than that of renewing oil-lamps; also that the lanterns to the oil-lamps must now be renewed if they were not converted into gas-lanterns. There were at present 98 oil-lamps, and the Gas Company's proposals would permit of the conversion of 53 lamps. The Committee recommended that, in order to get the gas-mains extended forthwith, the present contract with the Gas Company be determined, and a new one be entered into for seven years; and that the Committee be authorized to arrange the necessary details. Mr. Burne said that having considered the relative merits of gas and electricity, the Committee had no hesitation in saying that the former was the better illuminant. It was cheaper, it gave more light for the same money, and the light was a better kind—it carried farther, and did not dazzle so much. The report was adopted.

GUERNSEY WATER-WORKS COMPANY, LIMITED.

Last Tuesday, Mr. Justice Buckley heard a petition presented by the Company and the Liquidator, asking the Court to sanction a scheme of reconstruction under the Joint-Stock Companies Arrangement Act, 1870. The Company was incorporated to supply Guernsey with water; but, owing to a series of droughts, the concern had not been very successful—in fact, no dividend had ever been paid, and there was a large sum to the debit of the profit and loss account. Application had recently been made to the State for a new concession, enabling the Company to take water from certain streams as well as from wells; and it was believed that the new Company would be a success. In April last, resolutions were passed sanctioning reconstruction; and the scheme provided for forming a new Company, with a nominal capital of £50,000, to acquire the old undertaking, paying for it £32,500 in shares, which were to be divided in certain proportions between the share and debenture holders. The scheme, which had been approved, provided for paying off all the creditors of the Company. His Lordship perused the scheme, and then sanctioned it.

REPAYMENT OF WATER-WORKS LOANS.

In the course of the speeches which followed an inspection by the members of the Bury Town Council of the reservoirs which are being constructed at Scout and Ogden for the Bury and District Joint Water Board, some remarks were made on the subject of the period of repayment of water-works loans.

Mr. Byrom, one of the Contractors, said, speaking as a ratepayer of Bury, he could easily see that in connection with the water-works they would be spending money at a quicker rate than their income would increase. It was a well-known fact that water-works became more and more valuable as time went on, and did not depreciate like some other undertakings. If water-works were properly made at the beginning, there was no limit to the time they would last; and therefore he thought they would be quite right in asking for a longer period in which to repay the borrowed money.

This brought forth a response by the Town Clerk, who pointed out that he went into the matter some time ago, when he was considering the question of readjusting the finances of the Water Board. He started with a predisposition in favour of extending the time of repayment; but in the light of the experience he had gained since, he must confess that he was not a lover of long terms for the repayment of capital expenditure on municipal works. Water-works, gas-works, sewage-works, and electricity-works, he agreed, were distinguishable; and the various terms of repayment should be suited to the class of work and the capital expenditure. Ten years ago, as much as forty years were given to repay loans on electricity-works; but now not more than twenty-five years were allowed. This showed the tendency of parliamentary opinion; and he did not know that even for reservoirs—except for the land on which they stood—Parliament would be justified in giving a longer term than sixty years.

LINCOLN CORPORATION WATER SUPPLY.

Additional Storage Works.

At the last Meeting of the Lincoln City Council, the minutes presented by the Water Committee set forth that they had considered a report received from Mr. Percy Griffith, their Consulting Engineer, as to the diameter and further depth of the bore into the sandstone, with the object of raising as much water as can properly and safely be brought to the surface, and had resolved: "That this Committee recommends that the diameter of the bore be 24 inches at the bottom, which the Engineer advises shall be 2200 feet from the surface, and that the Sub-Committee (consisting of the Chairman and Councillors Livens and Ruston) be authorized to arrange the extra price to be paid to the Contractors for keeping the bore 24 inches in diameter instead of 12 inches as specified in the contract."

The Committee also mentioned that they had considered the report, dated March 15 last, presented by their Engineer, Mr. Neil M'K. Barron, on the condition of the reservoirs and distributing plant, in the course of which he stated as follows: (1) "The reservoir accommodation is inadequate. (2) The storing in open reservoirs of filtered water, or water from subterranean sources, causes great deterioration in its quality and purity. (3) This deterioration is much greater when the reservoirs, in addition to being open, are so constructed as to hold at all levels a proportion of the water in small depth, and when the sides of the reservoir are of such a nature as to be a good breeding-ground for low forms of life. (4) The pressure in the high districts is inadequate, resulting in some cases in insanitary conditions arising. (5) The drawing of the supply direct from the pumping mains, and pumping into two mains at different pressures, is uneconomical, calls for unnecessary watchfulness and anxiety on the attendants, and is generally bad practice. (6) The principal mains are too small for efficient working, and, owing to corrosion, they will continue to get less effective. For the same reason they cannot be put under any additional pressure." As the result of their consideration of Mr. Barron's report and the recommendations accompanying it, the Committee passed the following resolution: "That the construction of a water-tower above the hill, capable of holding 300,000 gallons of water, at an estimated cost of £7000, be recommended; that the present reservoir on Cross-o'-Cliff Hill be abandoned; that a new covered reservoir be recommended to be constructed, capable of holding 8 million gallons, on the top of Cross-o'-Cliff Hill, at an estimated cost of £31,500." The recommendations were discussed *in camera;* and then a final decision upon the minutes was adjourned till October.

Unsatisfactory Electric Lighting at St. Helens.—The Gas Committee of the St. Helens Corporation are dissatisfied with the electric arc lamps used for the lighting of the principal streets. It is suggested that the arc lamps be removed and incandescent gas-lamps substituted; but the matter has been referred to the Chairmen of the Gas and Electric Committees for further consideration.

Wolstanton Gas-Works Purchase.—Arising out of a minute of the Highways Committee, presented at the last meeting of the Wolstanton Urban District Council, to the effect that, as the Wolstanton Gas Bill had passed, it was necessary that the Council should consider the question of providing public lighting in Chesterton for the coming winter, Mr. Boulton said he thought the project would prove of great benefit to the inhabitants, and would eventually help to reduce the rates. He felt that their hearty thanks were due to Mr. Hollinshead (the Clerk) and others who had seen them through, despite the very strong opposition. Messrs. Corbet Woodall and Son were instructed to take the necessary steps to provide public lighting in Chesterton without delay, including the temporary repair or alteration of the gas-works, and the laying of the new main where required, having regard to the larger scheme of lighting the whole district; and the firm were requested to prepare plans and detailed particulars of a scheme for a provision of new works to light the whole district.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Thursday was one of the great days of the year in the Glasgow Town Council. The principal item of interest for us was the consideration of the annual report and accounts of the Gas Committee. The report of the Committee, together with a summary of the accounts, and an account of what took place in the Council when considering them, appears in another part of the "JOURNAL." There was a buoyant spirit in the report of the Committee, which was but a reflex of the accounts, upon which it was founded. These show a capacity for expansion which is, to say the least, exceedingly hopeful. It cannot be said that the Gas Department received any adventitious aid during the year. Therefore the increase in the business must be looked for in the general improvement of the community—in trade and comfort. In the discussion which followed the submission of the accounts, the Committee not having put forward any new policy, the remarks made were not of an order which could be designated original. The rate of contribution to the sinking fund and the rate of depreciation are not always matters of policy so much as of capability and expediency; and it must be confessed that much of what was said upon these subjects rather pointed to the speakers not understanding very well what they were talking about. For instance, speakers had to be reminded that the sinking fund is fixed by statute, and is not matter of option; while as to depreciation, opinions upon it will be found to be about as various as are the members of the Corporation. The question of the increased price charged for gas consumed through prepayment meters is one in which policy emerges; and it is probably to be regretted that a fuller explanation of the reason for the extra charge was not given. The only remarks to which exception could be taken were those of Mr. G. Battersby, who complained of the price of the gas. Mr. Battersby is distinguished for his straightforwardness. But it is possible to be short-sighted as well as straightforward; and this seems to be Mr. Battersby's position. No exception could be taken to the spirit of his remarks; but they were not helpful. It is a credit to the Corporation that his was only as a voice crying in the wilderness. In the early part of the meeting, Mr. Edward Scott asked the Convener of the Watching and Lighting Committee about their arrangements for the lighting of common stairs and back courts, and was informed by Mr. Cleland that the Committee were almost in a position to report as to stair lighting, but as they were about to appoint a head of the Lighting Department, they thought it better that the subject should be delayed meantime. Mr. Scott then gave notice of a motion to the effect that they should improve the lighting of common stairs, closes, back courts, and back streets in the poorer districts of the city, and that these localities should receive priority over any other part, until they were as well provided as other districts of the city.

On another page will be found a report of the proceedings in an appeal by the pursuer in the action against the Bothwell and Uddingston Gas Company, Limited, with reference to their charges for gas. The pursuer, it will be observed, has lost in the appeal, as he did in the Court of First Instance; but he is going to appeal again, upon the question of expenses. The action is of interest as giving some indication of the powers of gas companies in the recovery of accounts for gas. The lesson is that they are not bound to first obtain decree, but may at once proceed to cut off the gas supply. Whether it be a following up of this decision or not I cannot say, but I observe that in the neighbouring burgh of Airdrie the Corporation Gas Department are to-day advertising that unless overdue gas accounts of the May term are paid by the 20th inst., those in arrear are liable to have their supply discontinued.

In the Peterhead Town Council on Monday, Bailie Ritchie, the Convener of the Gas Committee, said he was glad to have the satisfaction of laying before them the details of the balance-sheet, from which they would see that the department had once more had a very prosperous and profitable year. During the twelve months they sold 33 900,000 cubic feet of gas. From this, at the price of 3s. 6d per 1000 cubic feet, they realized a revenue of £6085. This showed an increased consumption of 3 million cubic feet—equal to 9 per cent.—and a revenue of £544 over the previous year. From residual products they had realized £1390—an increase of £254. Their total profit was £7525—an increase of £788. On the expenditure side, 4000 tons of coal cost them £3280—an increase of 371 tons, and of £480 in price. Purifying cost £49—an increase of £16, but a remarkable saving on the cost of this work previous to the introduction of the new condensing and scrubbing plant. Stokers' wages amounted to £415—an increase of £13; and salaries amounted to £285—an increase of £33. Discounts had reduced their revenue by £225—an increase of £47. Maintenance of works required £498—a decrease of £29. Distribution cost £161—an increase of £24. The total expenditure amounted to £5335, which left a balance of £2120. Adding to this the sum of £1280 brought forward from the previous year, and £60 of rent realized, they had a balance at the credit of the profit and loss account of £3532. From this they deducted £1489 for interest, sinking fund, and estimated bad debts, which left a balance of £2082, or £800 more than they had a year ago. The Gas Committee recommended that they debit the past year with £400 as part of the cost of the new retort-bench, which would leave a balance of the cost of about £200 to be met out of the current year. They proposed also to reduce the price of gas by 3d. per 1000 cubic feet to all classes of consumers; the present discounts to remain in force. The charge would then be 3s. 3d. per 1000 cubic feet, with 5 per cent. off for lighting, and 7½ per cent. off for power purposes. They had now 870 prepayment meter consumers; and they had used 6,260,000 cubic feet of gas, which accounted for £1250 of revenue. They regretted the resignation of their late Manager—Mr. John Keillor—to whose skill and energy they owed the success of their last three years' operations; but, so far, Mr. W. Ritchie, their new Manager, had proved himself very efficient. The report and recommendations were unanimously adopted.

There have been frequent thunderstorms in Scotland during the past ten days, which have, in more than one instance, damaged gas-pipes.

In Galashiels a gas-pipe in a sawmill was fused, and the gas set on fire; a great volume of flame issuing. At Haddo House, the seat of the Earl of Aberdeen, a gas-pipe was fused and the rafters of the house set on fire; but the smell of burning was perceived by the servants, and the fire was put out before any serious injury was done. In Broughty Ferry the sound of rushing water called the attention of the inmates of a house to the fact that both gas and water pipes had been damaged by lightning. In this instance practically no other damage was done to the premises.

Presenting the burgh accounts for the past year in the Newport (Fife) Town Council on Monday, Mr. Leitch, the Convener of the Finance Committee, said there was a decrease of about £200 in the assessable rental of the burgh, which had been caused partly by a re-arrangement of the valuation of the gas-pipes. The quantity of gas sold showed an increase of over a million cubic feet. The revenue from the sale of residual products showed a satisfactory increase. To still further encourage the use of gas-cookers, he would suggest that cooker and meter rents should be abolished. After making allowance for stocks of material and gas on hand, the revenue account showed a credit balance of £1059; and the Council should consider the advisability of carrying a part of this sum—say, £1000—to a special reserve fund for depreciation and contingencies in connection with the gas-works. The accounts were unanimously adopted.

In the Denny Town Council last week, it was reported that, on account of the want of efficient gas-fittings in their houses, a large number of householders in the burgh do not use gas; and it was agreed to make a special effort in the putting of pressure upon landlords to have fittings introduced into such houses, where the tenants desire to burn gas. It was also resolved, where necessary, to assist the tenants in obtaining gas-fittings; and arrangements were made whereby the Council will be reimbursed for any outlay made by them.

The thirtieth annual meeting of the Penicuik Gas Company, Limited, was held on Thursday. The Directors reported that, after writing off £237, being the balance of the loss sustained in an action for damages against them, there remained a sum of £340 at the credit of profit and loss account. From this there fell to be deducted £95; being the usual preference dividend of 5 per cent.—leaving for disposal £245. They recommended that a dividend be paid to the ordinary shareholders at the rate of 4 per cent., free of income-tax, and that a balance of £5 be carried forward. The report was adopted.

The statement submitted by Treasurer M'Kean to the Corporation of Paisley, relative to the gas undertaking (see p. 465), is a notable one in more respects than one. It shows a wondrous vitality in the undertaking. An increase of 29 million cubic feet in gas accounted for is something to be proud of. In the previous year there was a drop of about 3 million cubic feet in the gas consumed—a merely incidental drop in such a large consumption. Then the price was reduced by a 1d. per 1000 cubic feet, and better conditions were given for the use of appliances for cooking and heating by gas. The result has been an encouraging bound forward in the demand for gas. The number of appliances sent out during the year is a very gratifying response to the endeavour of the Corporation to extend the use of gas. While it is well that such large surpluses can be made year by year, it is not so pleasant to contemplate that these surpluses are chiefly appropriated by the Corporation for general burgh purposes. Thus, two years ago, out of an available surplus of £6179, as much as £6163 was appropriated, of which, however, £3068 was applied to the making up of the deficiency upon the electric lighting account, which would be statutory—leaving £3100 for the relief of rates. A year ago, out of a profit of £5849, there was applied to the deficiency upon the electric lighting account £1085, and to relief of the rates £3700—leaving £1064 to be carried forward. Now this year, out of £4000, a sum of £2800 is applied to the relief of the rates. While these amounts are taken away perforce, it cannot be said that the finances of the gas undertaking are in any way starved—in fact, it is rather the other way, because the sinking fund is always liberally attended to; and this year I find that £1137 has been set aside from revenue to form a new contingency and depreciation fund. This has been done on account of prospective borrowing, and because of the desire of the Corporation to hold in their hands provision for wiping out the new liabilities.

Gas Cookers and Slot-Meters as Smoke Preventers.—A medical man recently remarking upon the clearness of the Manchester atmosphere is reported to have said: "This is due to gas-cookers and slot-meters. When the authorities reduce the price of gas for fires, we shall have the same immunity from smoke during the winter months."

Water Famine at Wombwell.—Owing to a dispute which has arisen between the Dearne Valley Water Company and the Wombwell Urban District Council, there is a serious water famine in the district, in which there is a population of 15,000. It appears that when the Company was formed, more than a quarter-of-a-century ago, an agreement was entered into with the Wombwell authority to supply the village at 6d. per 1000 gallons. For upwards of 26 years there was not much difficulty about the whole of the township having a proper supply—until, in fact, the Water Company ceased to deliver the water over Roebuck Hill. The water has to be forced, in the first place, by the Company through one of the most densely populated parts of the town, to a distance of close upon two miles out of Wombwell, before it reaches Roebuck Hill. The Council contend that if the meter in the centre of the town had been available, as it was during the time the present Secretary of the Company was Clerk to the District Council, the whole township would still be assured of an efficient supply without having to resort to the present expense of pumping it. An old steam-roller engine was at first used to force the water over the hill; but arrangements were made for a much more powerful one to be fixed. This it was believed would enable the Council to take all the water the Company could supply the township with at the point of delivery.

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CURRENT SALES OF GAS PRODUCTS.

Week ending Aug. 11.

The London market for tar products is decidedly better. There is a good deal of inquiry for pitch, and makers' and buyers' ideas of price are getting more into line; makers being firm at 32s. Benzol is in good demand; but the quantities available are small. There is also a good inquiry for salty creosote, which is firm at 2¼d. Sulphate of ammonia is improving, and is quoted, on Beckton terms, at £12 2s. 6d.

Sulphate of Ammonia. LIVERPOOL, *Aug.* 11.

Interest in the prompt position has been sustained, and there has been a further slight improvement in values, the closing quotations being £11 6s. 3d. per ton f.o.b. Hull, and £11 17s. 6d. to £11 18s. 9d. per ton f.o.b. Liverpool and Leith. The exports for July show a shrinkage of about 1000 tons, compared with July, 1905, shipments. For September delivery, £12 per ton f.o.b. is being paid. Although there has been more inquiry from direct buyers for delivery ahead, not much has come of it, buyers' ideas being very little above the spot level of values; and speculative buyers seem to have been brought to a standstill by the higher demands of makers, more particularly for January-April and January-June, 1907, delivery.

Nitrate of Soda.

This article is steady on spot, at 11s. 3d. to 11s. 6d. per cwt., according to quality.

Tar Products. LONDON, *Aug.* 11.

Business has been very quiet during the past week; most of the works being closed for the annual holidays. In pitch a small parcel has been sold in London for prompt delivery at 27s. 3d.; but for forward manufacturers are still very firm in their ideas, though it does not appear probable that very much business has been done up to the present. One or two consumers on the Continent seem inclined to purchase small parcels for prompt delivery; but the prices offered are very low. Business continues to be done in South Wales from time to time at fair prices. Consumers in this district still appear willing to buy for delivery over the first six months of next year; but manufacturers are not disposed to sell their make so far forward. As regards creosote, in London makers are still very firm in their ideas, and appear to be practically out of the market; it being quite impossible to realize the prices indicated by them. One or two second-hand parcels have been offered at 1⅞d. per gallon into barges alongside works, apparently without finding buyers. Country oil has been sold for prompt delivery in London at a low figure; but manufacturers in the Midlands and the North appear to be pretty well sold, and not inclined for further business except at good prices, though creosoters report that parcels are placed before them at a reasonable figure from time to time by dealers who no doubt bought some little time ago. Anthracene remains unchanged. A small parcel of 40 per cent. has been sold at 1½d. per unit free delivered to consumers' works; while the Continental consumers appear inclined to buy 80 per cent. if they could get a suitable quality at a low price. In solvent naphtha, the demand for London qualities still remains good, and manufacturers are asking 1s. 3d. per gallon for 95 per cent. for delivery up to the end of the year. The position remains absolutely unchanged in carbolic acid. Continental consumers refuse to pay more than 1s. 9d., but rather better prices are reported to have been paid in several instances. In crystals, the market remains in the same position, and there is no business reported to have been done. In toluol, London makers are still asking 1s. 2d. for any quantity which they may have for delivery. But one or two parcels which have been offered in the Midland district for delivery to the end of the year at reasonable prices have been refused; and it is evident that the demand for pure toluol has to some extent fallen off. There is no alteration in 90 per cent. benzol. Small parcels are sold from time to time in London at fair prices; but low figures are said to have been accepted in the North for prompt delivery. In 50-90 per cent., there is very little offering. A small parcel is reported to have been sold at a fairly good price for delivery in the Manchester district.

The average values during the week were: Tar, 15s. to 19s. 6d. Pitch, London, 27s. 3d.; east coast, 26s. to 26s. 6d.; west coast, 25s. 3d. to 25s. 9d. Benzol, 90 per cent., 9¼d. to 9½d.; 50-90 per cent., 10⅜d. Toluol, 1s. 0½d. to 1s. 2d. Crude naphtha, 3⅛d. to 4¼d.; solvent naphtha, 1s. to 1s. 2d.; heavy naphtha, 10½d. to 1s. Creosote, London, 1⅞d. to 2d.; North, 1½d. to 1⅝d. Heavy oils, 2¼d. Carbolic acid, 60 per cent., 1s. 9¼d. to 1s. 9½d. Naphthalene, £4 10s. to £9 10s.; salts, 26s. to 27s. 6d. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market remains firm, but very little business has been arranged during the past week; makers having very little to dispose of. Beckton are not sellers; but other London makes could probably be obtained at from £11 15s. to £11 17s. 6d. In Hull, the market value may be taken as from £11 15s. to £11 17s. 6d., without any business of importance having taken place. In Liverpool, the prompt value is from £11 17s. 6d. to £11 18s. 9d.; while in Leith £11 17s. 6d. to £12 is about the current quotation. The market forward is very firm, and values for October-March may be taken as about 5s. premium on the above prices, and for January-April at from 7s. 6d. to 10s. premium.

Interfering with a Gas Inspector.—At the Manchester Police Court, on Friday, Alfred Tootles, a shopkeeper, who refused to supply a Corporation gas inspector with the key of adjoining premises in order to allow an inspection of the meter, and who also struck the man and kicked him into the street, was fined 5s. and costs.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

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	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
Blackburn	1,250,000	Winnipeg, Man.	500,000	Malton	150,000
Windsor St. Works, Birmingham	2,000,000	Colchester (Second Contract)	300,000	Smethwick	500,000
Saltley Works, Birmingham	2,000,000	York	750,000	Gravesend	300,000
Colchester	300,000	Rochester	500,000	Pernambuco, Brazil	125,000
Birkenhead	2,250,000	Kingston, Ont.	300,000	Duluth, (Second Contract)	300,000
Devizes	120,000	Crystal Palace District	2,000,000	Leicester (Second Contract)	1,000,000
Saltley, Birmingham (Second Contract)	2,000,000	Duluth, Minn.	300,000	Newport (Second Contract)	250,000
Windsor St., Birmingham (Second Contract)	2,000,000	Caterham	150,000	Brockville	250,000
Halifax	1,000,000	Leicester	2,000,000	Toronto (Third Contract)	750,000
Toronto	250,000	Enschede, Holland	150,000	Montreal, Ont. (Second Con.)	1,800,000
Ottawa	250,000	Buenos Ayres (River Plate Co.)	700,000	Toronto (Fourth Contract)	1,000,000
Lindsay (Remodelled)	125,000	Burnley	1,500,000	Hamilton, Ont.	400,000
Montreal	500,000	Kingston-on-Thames	1,750,000	Rochester (Third Contract)	1,600,000
Toronto (2nd Cont., Remodelled)	2,000,000	Accrington	500,000	Leeds (Second Contract)	900,000
Belleville	250,000	Tonbridge	300,000	Buenos Ayres (Primitiva Co.)	1,200,000
Ottawa (Second Contract)	250,000	Stretford	500,000	Buenos Ayres (New Co.)	1,200,000
Brantford (Remodelled)	200,000	Oldbury	300,000	Christchurch, N.Z.	300,000
St. Catherines (Remodelled)	250,000	Todmorden	500,000	Rochdale	1,600,000
Kingston, Pa.	125,000	Saltley, Birmingham (Third Contract)	2,000,000	St. John's, Newfoundland	250,000
Peterborough, Ont.	250,000	York (Second Contract)	750,000	Brantford (Second Contract)	400,000
Wilkesbarre, Pa.	750,000	Rochester (Second Contract)	500,000	Smethwick (Second Contract)	500,000
St. Catherines (Second Cont.)	250,000	Newport (Mon.)	250,000	Pontypridd	250,000
Buffalo, N.Y.	2,000,000	Tokio, Japan	1,000,000	Montreal (Third Contract)	1,800,000
		Newcastle-on-Tyne	1,800,000	Guelph, Ont.	350,000
		Leeds	1,800,000	Buenos Ayres (River Plate Co.) Second Contract	750,000
				Belgrano (River Plate Co.)	500,000

And, in addition, COAL GAS PLANTS at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

COAL TRADE REPORTS.

Lancashire Coal Trade.

There is no real change to report in the coal trade of the county. Owing to the strong demand for slack and all kinds of engine fuel, there is some scarcity of this class. A fair amount of shipping coal finds its way to the Ship Canal tips, chiefly from the Wigan and Tyldesley districts. The supply for the most part is for steam vessels. House coal is stagnant. Gas coal and cannel are being sent out under contract to various municipal corporations in rather larger consignments owing to the shortening days. The eight-hour day is being discussed among the men, who seem to be in a majority in its favour. Should legislation result in their favour, the same amount of pay for day labourers will be equivalent to an increase in wages. Furnace coke is in steady request. Quotations at the pits are: Best house coal 13s. to 14s., secondary 12s. to 13s., common 9s. to 10s., steam and forge 8s. to 9s., best engine fuel 7s. 6d. to 8s. 6d., best slack 6s. 9d. to 7s. 6d., medium 6s. to 7s., common 5s. to 6s. Coal for shipping is 9s. 6d. to 10s. 6d. per ton.

Northern Coal Trade.

There is a heavy demand for coal, both for export and for home use; and this makes prices stiffer for the kinds that are most in request. Shipments, both of steam and gas coals, have been heavy. In the steam coal trade, the collieries are well employed; and the demand is full—best Northumbrian steam coals being steady at 10s. 9d. per ton f.o.b. Second-class steams are from 9s. 9d. to 10s., and steam smalls are 6s. to 6s. 3d. Shipments are well maintained; and the near Continental countries seem to be taking larger quantities than are usual at this time of the year. In the gas coal trade, there is also great activity and firm prices. Deliveries on the long contracts are now heavier with the increasing consumption, and the exports from the local ports are rather above the usual quantity. As to prices, Durham gas coals vary now, according to the quality, from about 9s. 9d. to 10s. 9d. per ton, though slightly above the latter figure has been quoted in one or two cases for forward delivery. There have been no contracts of moment definitely reported, though one for some 30,000 tons for Naples is believed to have been placed, at a price, delivered at that port, somewhere near 16s. 9d. per ton, which would be a good value. Coke is steady; but gas coke is now in increased demand, and stocks at the inland works are rather larger. Prices of gas coke are still quoted from 10s. 3d. to 10s. 9d. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

The projected removal of the coal-tax is making itself unmistakably felt in the market. For some time forward trade has been slower than usual; and it may now be expected to be fully more so—seeing that the coalowners have met in Glasgow, and resolved that every endeavour be made to secure an advance of 1s. per ton after the 1st of November. This, upon the present prices, is equal to an advance of nearly 3 per cent. With this prospect, and an improved local demand, the market is described as fairly active, and is likely to remain so. The prices quoted are: Main 7s. 9d. to 8s. per ton f.o.b. Glasgow, ell 8s. 6d. to 10s., and splint 9s. 3d. to 9s. 6d. The shipments for the week amounted to 274,225 tons—an increase of 39,146 tons upon the previous week, and of 18,584 tons upon the same week of last year. For the year to date, the total shipments have been 7,917,030 tons—an increase of 785,482 tons upon the corresponding period of 1905.

Gas Manager in a Motor-Car Accident.

On the evening of Wednesday, the 25th ult., Mr. L. Hislop, the Engineer and Manager of the Bothwell and Uddingston Gas Company, Limited, met with severe injuries in an accident which happened to a motor-car in which he was riding, on a journey southwards from Lanarkshire. When nearing Kirtlebridge, in Dumfriesshire, the left front wheel of the car suddenly collapsed, and the car bounded into a hedge, reared, and fell into a field beyond. The driver escaped unhurt, and the owner of the car was only slightly injured. Mr. Hislop was shot out of the car, a distance of about 50 feet. Although severely bruised upon the back, and, it was feared, injured internally, he was able to be removed to his home on the following day. Mr. Hislop's rapid recovery after a severe operation last winter testified to his possession of more than the customary recuperative powers. He has given his friends equal gratification on this occasion, for exactly a week after the accident he paid a visit to the local bowling-green, looking little the worse for his mishap.

Fatal Fire at Leytonstone.—A fire which occurred at a clothier's shop in the High Road, Leytonstone, on Saturday morning, resulted in the death of two of the children of the occupier, Mr. George Halls. It is reported that the fire was caused by defective gas-fittings; and when discovered it was well alight. Efforts were made by the firemen of the Leyton Brigade to get to the children; and eventually Lieutenant Hidden and Fireman Wilkinson broke through the smoke and flames and brought two out of a bedroom. They were George, aged eighteen months, and a baby of three months; and both died from suffocation and shock an hour after their rescue.

Fire at Bishop's Stortford Gas-Works.—Last Friday evening, a serious fire occurred at the Bishop's Stortford Gas-Works, It started in the engine-room through the blowing out of a syphon, causing the gas to ignite at a bye-pass. The flames quickly spread to an adjoining malting belonging to Messrs. H. A. & W. Taylor, which was well alight when the Fire Brigade arrived on the scene. The precaution was taken of stopping gas making during the conflagration. Plenty of water was obtainable, and eventually the outbreak was got under, but not until after considerable damage had been done to the machinery and works, and to the malting. The fire did not cause any interruption of the gas supply to the town.

The Position of the Kent County Gas Company.—We learn from he "Daily Mail" that a circular was issued last Wednesday giving notice of the statutory meeting of this Company, and furnishing the provisions required by the Companies' Acts. It seems that 2438 ordinary shares of £5 each are recorded as paid up in full, and also 2020 preference shares. On 791 other ordinary shares and 551 preference shares only about £2300 in all has been received. "But," says our contemporary, "the most interesting point perhaps is that Mr. S. B. Darwin's name figures among the Directors. It will be recalled that various statements have appeared to the effect that Mr. Darwin had severed his connection with the directorate; and it would be interesting to know what has happened."

The Pollution of Rivers.—At the recent meeting of the American Water-Works Association, Mr. M. O. Leighton read a paper on "River Pollution," in which he stated that if a river has a certain amount of pollution, there is but little practical use in spending money in clarifying sewage flowing into it below the point of contamination. He held that a certain quantity of inevitable pollution must be expected; but there is no excuse for the discharge of chemical refuse and other preventable impurities from factories, &c. Apart from his paper, Mr. Leighton called attention to the valuable character of the hydrographic investigations being carried on by the Federal Government, which are mainly for the assistance of people interested in water sources, and are a laudable effort to determine the character of these sources from all standpoints. Although the Government has been carrying on this work for more than 12 years, it has not received the general appreciation which it deserves, especially from water-works and water-power engineers, who, as a rule, are but little informed respecting it and have failed to avail themselves of its full benefits. Mr. Leighton suggested that the Association might well take a supervisory part in those investigations, and appoint a Committee to work in collaboration with them, so that their further usefulness might be enhanced. Such a Committee might exercise possibly a supervisory part, and assist in rendering the work more definite and purposeful in character for the use of water-works men. The recommendation was concurred in by several speakers, Mr. Allen Hazen heartily seconded the suggestion for the appointment of a Committee. He said the Survey had done valuable work in mapping the country, and he considered the investigation of the flow of streams comparable in importance to that work.

Last Friday, the premises in Soho Square in the occupation of Messrs. L. Noel and Sons were the scene of an exciting fire. The outbreak, which is understood to have been caused by the fusing of an electric wire, was not extinguished until the shop and the second and third floors had been severely damaged.

The shortage of water which has lately been experienced in Mid-Sussex has come to an end; new pumping machinery at the Balcombe Water-Works having removed the sand which blocked the fissures in the well from which the water supply for the district is drawn. We learn that it is intended to construct a large reservoir at Cuckfield.

The Withnell Urban District Council Gas Department, who instructed the Richmond Gas Stove and Meter Company, Limited, some few months since to supply and fit up automatic installations on their behalf, have now entrusted to the Company the further development of their district; and an exhibition is being held and an active canvass is going on.

At the recent meeting of the British Association, Professor Arthur Smithells ridiculed the placing of a poker across the firebars to make the fire draw. Referring to the matter, the "Evening Standard" on Saturday said: "If the Association could induce gas authorities to supply gas for fires at the reduced rates now common for gas-engine consumption, we should soon see the poker abolished, and with it the smoke nuisance."

Subject to final audit, the Directors of the Bournemouth Gas and Water Company declared, at their meeting held on the 10th inst., dividends for the half year ended June 30 at the rate of 6, 7, and 14 per cent. per annum on the preference, "B" ordinary, and original shares of the Company respectively—the dividend on the 2000 shares issued in December last to run from the respective dates of payment; leaving a balance of £5417 to be carried forward.

Last Tuesday week, Messrs. Hepper and Sons offered for sale in Leeds the freehold engineering works in Hunslet, by order of the Trustees to the debenture stockholders in "Graham, Morton, Limited." The total area is about 22,203 square yards. The motive power and fixtures were offered for sale with the freehold. Bidding started at £12,000, and rose by sums of £250 to £13,500, at which figure the property was sold to Mr. Joseph Henry, of Leeds.

The firemen forming the A and B brigades in connection with the Warrington works of the Richmond Gas Stove and Meter Company, Limited, recently had their second annual outing; the destination chosen being the Bridge Inn, Gateacre. In the afternoon, a bowling main, confined to the members of the brigades, was played on the green; and though the weather was rather unfavourable, the game was kept up with much spirit. Four prizes and two "consolation" prizes were awarded; the winners of the first in each group being Mr. T. Edeleston and Mr. W. Nicholson respectively. After dinner, a smoking concert was held in the pavilion—Mr. Burnett, the Superintendent of the brigades, in the chair.

With the laudable object of assisting the widow and children of the late Mr. Edward Howarth, who died from injuries received in the recent explosion and fire at the Coventry Corporation Gas-Works, a fête and concert recently took place. Mr. Fletcher W. Stevenson, the Gas Engineer to the Corporation, interested himself greatly in this praiseworthy effort; and, judging by the attendance and the large number of tickets disposed of, the event should prove a gratifying success. The Coventry Co-operative Festival Choir gave their services; but owing to a severe thunderstorm coming on early in the evening, the programme had to be considerably curtailed. The band of the Second Volunteer Battalion Royal Warwickshire Regiment, under the leadership of Mr. W. J. Scott, played enjoyable selections.

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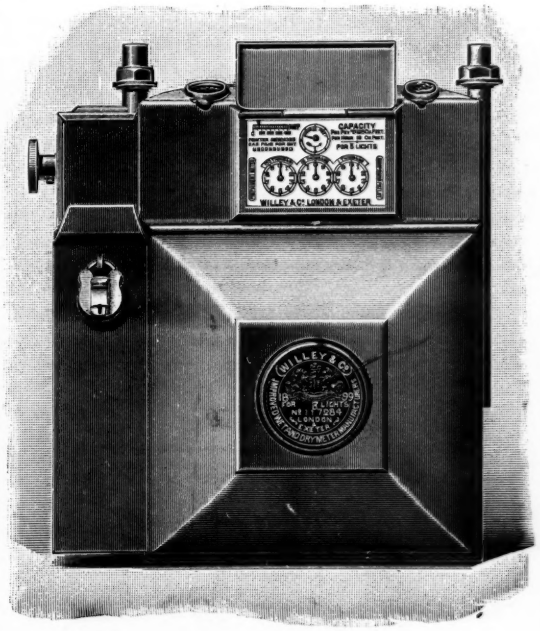

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Situations Vacant.

ENGINEER. Gosport Gas Company. Applications by Aug 23.
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INSPECTOR AND FOREMAN GAS FITTER. No. 4636.
WORKS FITTER. Swindon Gas Company. Applications by Aug. 18.
GAS-FITTER, MAIN, AND SERVICE LAYER. No. 4630.
STOKERS. Swindon Gas Company. Applications by Aug. 18.
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Situations Wanted.

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JUNIOR CLERK. No. 4634.

For Sale.

CORRESPONDENCE COLLEGE COMPANY, Cambridge.

Plant (Second-Hand) for Sale.

BOILERS, PUMPS, ENGINES, &c. Johnson Bros., Hindley.
CORNISH BOILER AND STEEL CHIMNEY. Redditch Gas Company.
HYDRAULIC MAIN, ASCENSION PIPES, ROOF, &c. Barrhead Gas-Works.
VALVES, PIPES, &c. Rotherham Gas-Works.

Stocks and Shares.

BEXHILL WATER AND GAS COMPANY. Aug. 28.

Company Meetings.

CRAYS GAS COMPANY. St. Mary Cray. Aug. 29. 6.30 o'clock.
HARROW AND STANMORE GAS COMPANY. Albion Tavern. Sept. 4. Twelve o'clock.

TENDERS FOR

Boiler.
LONGFORD GAS COMPANY. Tenders by Aug. 20.

Coal and Cannel.
SPALDING GAS DEPARTMENT. Tenders by Aug. 21.

Coke.
BURY GAS DEPARTMENT. Tenders by Aug. 18.

Gasholder and Steel Tank.
LONGFORD GAS COMPANY. Tenders by Aug. 30.

Pipes and Fittings,
LONGFORD GAS COMPANY. Tenders by Aug. 20.

Purifier.
LONGFORD GAS COMPANY. Tenders by Aug. 20.

Sulphate Still.
LONGFORD GAS COMPANY. Tenders by Aug. 20.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 431

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	20—21	..	5 0 0
160,000	10	,,	7½	Do. 7 p.c.	14½—15½	..	4 16 9
200,000	5	May 11	7	Bomb'ay, Ltd.. . . .	6¾—7¼	..	4 16 7
40,000	5	,,	7	Do. New, £4 paid	4¾—5¼	..	5 6 8
50,000	10	Mch. 9	14	Bourne-) 10 p.c. . .	28½—29½	..	4 14 11
51,810	10	,,	7	mouth Gas) B 7 p.c. .	17—18	..	3 17 9
53,200	10	,,	6	and Water) Pref. 6 p.c.	15—16	..	3 15 0
380,000	Stk.	Feb. 22	12½	Brentford Consolidated	263—268	..	4 13 3
300,000	,,	,,	9½	Do. New . . .	200—205	..	4 12 8
50,000	,,	,,	5	Do. 5 p.c. Pref. .	123—125	..	3 16 11
206,250	,,	June 14	4	Do. 4 p.c. Deb. .	103—106	..	3 15 6
220,000	Stk.	Mch. 9	11½	Brighton & Hove Orig.	232—237	+2	4 15 2
246,320	,,	,,	8½	Do. A. Ord. Stk. .	165—170	..	4 17 1
460,000	20	Apl. 11	10	British	41½—42½	..	4 14 1
104,000	Stk.	Feb. 22	6	Bromley, Ord. 5 p.c. .	121—124	..	4 16 9
165,700	,,	,,	4½	Do. do. 3½ p.c. .	92—95	..	4 14 9
500,000	10	May 11	7	Buenos Ayres (New) Ltd.	12—12½	..	5 12 0
250,000	Stk.	June 28	4	Do. 4 p.c. Deb. .	96—98	..	4 1 8
150,000	20	July 12	8½	Cagliari, Ltd. . . .	24—26	..	6 6 11
100,000	10	June 14	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.. .	9¾—10¼	..	4 7 10
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
50,000	Stk.	June 28	4½	Do. 4½ p.c. Deb. Stk.	98—100	..	4 10 0
1,443,280	Stk.	Feb. 22	5⅛	Commercial 4 p.c Stk. .	115—117	+1	4 8 10
560,000	,,	,,	5	Do. 3½ p.c. do. .	112—114	+1	4 7 9
475,000	,,	June 14	3	Do. 3 p.c. Deb. Stk.	84—86	..	3 9 9
800,000	Stk.	,,	6½	Continental Union, Ltd.	123—126	+1	5 3 2
200,000	,,	,,	7	Do. 7 p.c. Pref.	140—145	..	4 16 7
432,070	Stk.	Feb.	5½	Derby Con. Stk. . . .	122—124	..	4 8 9
55,000	,,	Jan.	4	Do. Deb. Stk. . . .	105—107	..	3 14 9
486,090	10	July 27	11	European, Ltd. . . .	24—25*	..	4 8 0
354,060	10	,,	11	Do. £7 10s. paid	18—19*	..	4 6 10
15,203,110	Stk.	Feb. 8	4⅛	Gas-) 4 p.c. Ord. . .	100—101	+1	4 7 2
2,600,000	,,	,,	3½	light) 3½ p.c. max. .	88—90	..	3 17 9
3,799,735	,,	,,	4	and) 4 p.c. Con. Pref.	108—111	..	3 12 1
4,193,975	,,	June 14	3	Coke) 3 p.c. Con. Deb.	86—88	..	3 8 2
258,740	Stk.	Mch. 9	5	Hastings & St. L. 3½ p.c.	100—105	..	3 15 3
82,500	,,	,,	6½	Do. do. 5 p.c.	121—124	..	5 4 10
70,000	10	Apl. 11	11	Hongkong & China, Ltd.	20—21	..	5 4 9
940,000	Stk.	May 11	8	Imperial Continental .	181—183	+2	4 7 5
473,600	Stk.	Feb. 8	3½	Do. 3½ p.c. Deb. Red.	96—98	..	3 11 5
175,242	Stk.	Mch. 28	6	Lea Bridge Ord. 5 p.c. .	121—126	..	4 15 3
561,000	Stk.	Feb. 22	10	Liverpool United A .	235—237	..	4 4 5
718,100	Stk.	Feb. 22	7	Liverpool United B .	169—171	..	4 1 10
306,083	,,	June 28	4	L'rpool Unit'd Deb. Stk.	107—109	..	3 13 5
75,000	5	June 28	5	Malta & Medn., Ltd. .	4¼—4¾	..	5 5 3
560,000	100	Apl. 2	5	Met. of) 5 p.c. Deb..	103—105	..	4 15 3
250,000	100	,,	4½	Melbourne) 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	May 31	3½	Monte Video, Ltd. . .	11—12	..	5 16 8
1,675,892	Stk.	Feb. 22	4½	Newc'tle & G'tesh'd Con.	111—113	..	4 1 10
406,625	Stk.	June 29	3½	Do. 3½ p.c. Deb.	97—99	..	3 10 8
15,000	10	Mch. 9	10	North Middlesex 10 p.c.	19½—20½	..	4 17 7
52,940	1.	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	May 11	8	Oriental, Ltd. . . .	150—153	..	5 4 7
600,000	5	Mch. 28	7	Ottoman, Ltd. . . .	6—6¼	..	5 5 7
398,490	5	Apl. 26	7	Primitiva Ord. . . .	6¼—6⅜	..	5 3 8
796,980	5	July 27	5	Do. 5 p.c. Pref. .	58—58*	+⅛	4 13 0
488,900	100	June 1	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
851,070	10	Apl. 26	7	River Plate Ord. . . .	12½—13	..	5 7 8
300,000	Stk.	June 28	4	Do. 4 p.c. Deb. .	96—98	..	4 1 8
250,000	10	Mch. 28	8	San Paulo, Ltd. . . .	14¼—14¾	+¼	5 8 6
70,000	50	July 2	5	Do. 5 p.c. Deb. .	49—51	..	4 18 0
135,000	Stk.	Mch. 28	10	Sheffield A	244—246	..	4 1 4
209,984	,,	,,	10	Do. B	243—245	..	4 1 8
523,498	,,	,,	10	Do. C	243—245	..	4 1 8
126,106	Stk.	Mch. 9	5½	Shrewsbury Ord. 5 p.c.	114—116	..	4 14 10
70,000	10	May 31	10	South African	16—17	+½	5 17 8
6,350,000	Stk.	Feb. 22	5½	South Met., 4 p.c. Ord.	133—135	+1	4 1 6
1,895,445	,,	July 12	3	Do. 3 p.c. Deb.	86—88	..	3 8 2
575,000	Stk.	Mch. 9	5½	S'th Suburb'n Ord. 5 p.c.	124—127	..	4 6 8
60,000	,,	,,	5	Do. 5 p.c. Pref. . .	125—130	..	3 16 11
112,533	,,	July 12	5	Do. 5 p.c. Deb. Stk.	128—133	..	3 15 2
502,310	Stk.	May 11	5	Southampton Ord. . .	107—112	..	4 9 3
120,000	Stk.	Mch. 9	6½	Tottenham) A 5 p.c. .	124—127	..	4 18 5
363,020	,,	,,	4½	and) B 3½ p.c. .	99—102	..	4 13 2
137,500	,,	June 28	4	Edmonton) 4 p.c. Deb.	103—105	..	3 16 2
182,380	10	June 14	8	Tuscan, Ltd.	10¼—10¾	..	7 8 10
149,900	10	July 2	5	Do. 5 p.c. Deb. Red.	100—103	..	4 17 1
30,000	Stk.	Feb. 22	8†	Wands-) A 5 p.c. . .	—	..	—
255,636	,,	,,	6½†	worth) B 3½ p.c. . .	135—140	+3	4 12 10
75,000	,,	,,	5⅝†	and) C 3½ p.c. . .	112—115	+2	4 17 5
79,416	,,	June 28	3	Putney) 3 p.c. Deb. Stk.	82—85	..	3 10 7
779,875	,,	Mch. 9	5½	West Ham 5 p.c. Ord. .	106—108	..	4 14 10
185,000	,,	,,	5	Do. 5 p.c. Pref. . .	122—125	..	4 0 0
193,300	,,	June 28	4	Do. 4 p.c. Deb. Stk.	104—107	..	3 14 9

Prices marked * are "Ex div." † Next dividend will be at this rate.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.

LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism London."

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

TEMPERLEY TRANSPORTERS
FOR Rapid and Economical Handling
of Coal and Coke in Gas-Works.
Next Illustrated Advertisement will appear on Aug. 28.
TEMPERLEY TRANSPORTER COMPANY,
72, BISHOPSGATE STREET WITHIN, LONDON, E.C.
Telephone: 365 LONDON WALL. Telegrams: "TRANSUMO."

BROTHERTON & CO., LIMITED.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

"VITERNUS" METALLIC PAINT FOR GAS-WORKS PLANT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
Telegrams: "ENAMEL." National Telephone 1759.

THE KEITH LIGHT.
OVER 3000 INSTALLATIONS IN DAILY USE.
SEE illustrated advertisement in next week's issue.
JAMES KEITH AND BLACKMAN CO., LTD., 27, Farringdon Avenue, LONDON, E.C.

GAS OILS.
MEADE-KING, ROBINSON, & CO.
Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, EXCHANGE STREET, MANCHESTER, and 11, OLD HALL STREET, LIVERPOOL.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAZINE—A radical Solvent and Preventative of Naphthalene deposits, which has been used for many years on the Continent for the cleaning of Mains and Services, and is now being adopted in England. It is also used for the Enrichment of Gas, and has an Illuminating Value of double that of 90 per cent. Benzol.
Supplied by C. BOURNE, West Moor Chemical Works, Killingworth, near NEWCASTLE-ON-TYNE.

GASHOLDER PAINTING.
PAINTING Work for all kinds of Gas-Works Plant, Roofs, Bridges, &c., undertaken by Contract or otherwise.
FREDERICK BOYALL, 31, Regent's Row, DALSTON, N.E.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

DUTCH OXIDE OF IRON.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

THE First Dutch Bogore Co., Ltd.,
HOLLAND.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

TAR AND LIQUOR WANTED.
Best Prices paid.
DENT AND CO.,
Ouse Chemical Works, SELBY.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

BENZOL
AND
CARBURINE FOR GAS ENRICHING.

ALSO
THE MAXIM PATENT CARBURETTOR.

For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD.,
7, BISHOPSGATE STREET WITHOUT,
LONDON, E.C.
Telegraphic Address: "Carburine, London."

APPLICANTS for the position of Show-ROOM ATTENDANT, advertised under No. 4620, are THANKED, and informed that the APPOINTMENT HAS BEEN MADE.

ADVERTISER seeks position under Gas Company as JUNIOR CLERK or Slot COLLECTOR. Three Years' Experience. Age 18. Good Reference.
Address, No. 4634, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOREIGN AND COLONIAL.
ENGINEER, just terminated a several years' Gas Engagement, is open to undertake any Foreign or Colonial Work in Lighting or Water. First-class References.
Address No. 4633, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Two Gas Stokers. Must be good Shovel and Scoop Chargers. Preference given to Men having worked the "Rapid" Charging Machine. Wages, 5s. per shift. None but reliable Men need apply.
THO. E. SHADBOLT,
Manager.
Gas-Works, Grays, Essex.

CARBONIZING Foreman wanted with good general Gas-Works Experience and Special Knowledge of Retort-House Machinery, Regenerative Settings, and Water-Gas Plant. Age not to exceed 35 years. Wages, £2 per week. Hours, 56 per week. Good character and habits essential.
Apply, by letter, to No. 4631, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Good Man as Inspector and FOREMAN GAS-FITTER. Qualified to arrange for Piping and Fitting Houses, &c., both economically and efficiently, and to prepare Estimates for work. Will have entire Management of Gas-Fitters, and Inspection of their work. Must be an active man and Cyclist, to cover extended district.
Applications, by letter, with References, to be sent to No. 4636, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for a large Provincial Gas Undertaking in the North of England, a thoroughly qualified Outside SUPERINTENDENT. Must have had Experience in Main-Laying and Public Lighting, and have a thorough knowledge of the proper Fitting up of Stoves, Fires, &c., &c. One who is capable of Photometrically Testing the various types of Burners, Mantles, &c., on the market preferred.
Applications, stating Age, Experience, and Salary required, together with *copies* of not more than Three recent Testimonials, to be addressed to No. 4632, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

OXIDE OF IRON.
(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, & MESSEL, LTD.
(with which is amalgamated WM. PEARCE & SONS, LTD.).
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341, AVENUE.

CHEMIST wanted for Tar-Works, with Experience in the Manufacture of Benzols, Carbolic Acid, Pyridine, &c.
Address, stating Salary wanted, No. 4635, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-FITTER, Main, and Service Layer wanted for a Gas-Works in Mid Wales. Must have had Experience on Gas-Works, and able to take Indices of Meters. Good opportunity for good Man.
Apply, by letter, stating Age, if Married, Weekly Wages and Hours, and how present employed, to No. 4630, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Two or Three Gas Stokers.
Must be good Shovel and Scoop Chargers. Preference given to men having worked with the "Rapid" Charging Machine. None but thoroughly reliable and sober men need apply.
Applications, stating Age, Height, with References, to be sent to me on or before the 18th of August.
H. C. SHEPHERD,
Manager.
Gas-Works, Chapel Street,
Swindon, Wilts.

SWINDON UNITED GAS COMPANY.
WANTED, a good all-round Works FITTER. Must be competent at Lathe Work, and able to undertake the necessary Repairs to Engines, Pumps, and the usual Machinery and Plant of a Gas-Works. A knowledge of Gas-Engines, also Repairs and Erection of usual Ironwork, would be an advantage, as time would be filled up with work of that description. None but steady and reliable men need apply.
Applications, with References, giving full Particulars of Experience, Wages required, and stating whether married or single, to be sent to me, on or before the 18th of August.
H. C. SHEPHERD,
Manager.
Gas-Works, Chapel Street,
Swindon, Wilts.

GOSPORT GAS AND COKE COMPANY.
THE Directors of the above Company invite APPLICATIONS for the position of GAS ENGINEER, at a Salary of £200 per Annum.
Applicants must be thoroughly conversant with every branch of Manufacture and Distribution, including Maintenance of Plant, Mainlaying, &c., and must be prepared to commence the duties at an early date. Age not to exceed 40.
Applications, stating Age, Qualifications, and Experience, with *copies* of Three recent Testimonials, to be sent to me not later than the 23rd inst.
Canvassing either directly or indirectly will be deemed a disqualification.
ALFRED LOACH,
Secretary and General Manager.
142, High Street, Gosport,
Aug. 2, 1906.

FOR SALE—Hydraulic Main, 77 ft. by 2 ft. by 2 ft. with 6 in. Dip Pipes and Ascension Pipes. All in splendid condition. Also Circular Iron Roof, 58 ft. span.
For further Information apply to J. W. CARMICHAEL, Manager, Gas-Works, BARRHEAD.

FOR SALE—One 10-inch Centre Valve and Connections complete. In good condition. Taken out to be replaced by larger one. Also a quantity of 10-inch Pipes and 10-inch Valves.
For Particulars, apply to E. O. WATSON, Manager, Gas-Works, Parkgate, ROTHERHAM.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

REDDITCH GAS COMPANY.
FOR SALE—Cornish Boiler, 12 ft. by 4 ft., insured for 40 lbs. pressure, and fitted with Meldrum's Furnace. All in perfect order. Replacing with larger.
Also WELDED STEEL CHIMNEY, 45 feet high, suitable for the above.
For further Particulars apply to A. E. LAYTON, Engineer and Manager.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS ELLAND.

SALE.

FOR SALE, as a going concern, the CORRESPONDENCE COLLEGE COMPANY. Suit Consulting Engineer. Good Investment.
Apply to the SECRETARY, 26, Green Street, CAMBRIDGE.

FOR SALE—Lancashire Boiler, 30 ft. by 7 ft., 90 lbs. pressure insured. Duplex Pumps, 10 in. by 6 in., 6 in. by 4 in., 5¼ in. by 3½ in., and 4½ in. by 2⅝ in. Three-Throw Pumps, 5 in., 4 in., and 2½ in. Rams. Compound Tangye Pumps, 14-inch and 24-inch Cylinders. 9½-inch Pump, suitable for 700 feet head. 200, 100, and 60 H.P. Engines.
JOHNSON BROS., Imperial Works, HINDLEY.

THE Corporation of Bury invite Tenders for the removal of surplus COKE from the Gas-Works. Estimated quantity, about 5000 Tons, the same to be removed between the 1st of October, 1906, and the 31st of March, 1907.

Forms of Tender and Conditions may be obtained from Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

The Corporation do not bind themselves to accept the highest or any Tender, or to consider any Tender for a quantity of less than 500 Tons, and further reserve to themselves the right to allot the quantity offered in such quantities as they may think fit.

Sealed Tenders to be delivered to the Town Clerk, Bury, not later than Saturday, the 18th of August, at Nine a.m.

LONGFORD GAS COMPANY, LIMITED.

THE Directors of the above Company are prepared to receive TENDERS for the supply and erection of a Steel GASHOLDER and TANK, One PURIFIER, One VERTICAL STEAM BOILER, One Continuous SULPHATE of AMMONIA STILL, and a quantity of STEEL GAS MAINS, and some CAST-IRON MAINS.

Full Particulars as to sizes and quantities can be obtained from the undersigned, to whom Tenders should be posted so as to be in his hands by Monday, the 20th day of August, 1906.

The Directors reserve to themselves the right of accepting any Tender in whole or in part, and do not bind themselves to accept the lowest or any Tender.

By order,
W. E. YOUNG,
Manager and Secretary.

Gas Office, Longford,
July 30, 1906.

SPALDING URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE above Council invite Tenders for the supply, during the period ending the 30th of June, 1907, of—

1.—2000 Tons of GAS COAL delivered f.o.b. Tyne.
2.—2000 Tons of GAS COAL or NUTS delivered f.o.b. Keadby, Goole, or Pit, or by Rail at Spalding Station.

Forms of Tender and other information can be obtained on application to Mr. H. R. Wimhurst, Engineer and Manager, Gas-Works, Spalding.

Tenders, on the prescribed Form, sealed and endorsed "Gas Coal," must be received by me on or before the 21st of August, 1906.

The Council do not bind themselves to accept the lowest or any Tender.

H. H. HARVEY,
Clerk to the Council.

Council Offices, Spalding,
Aug. 9, 1906.

BEXHILL WATER AND GAS COMPANY.

SALE BY TENDER OF ORDINARY SHARES.

THE Directors give Notice that they will be prepared to receive, not later than Twelve o'clock at Noon on Tuesday, the 28th day of August, 1906, sealed TENDERS for 1500 ORDINARY SHARES OF £10 EACH, being a further portion of the Additional Capital, the creation and issue of which was authorized under the powers of the Bexhill Water and Gas Order, 1901, by Resolution of the Extraordinary Meeting of the Shareholders of the Company held on the 30th day of January, 1902.

The Shares will rank with the existing Ordinary Shares for a Maximum Dividend of Seven per cent.

The Minimum Price below which no Tender will be accepted has been fixed at £10 10s. per share.

In the event of the receipt of Tenders at the lowest price accepted for a larger number of Shares than those proposed to be issued, such Tenders will be subject to a *pro rata* diminution.

Every purchaser will be required, on notice being given of the acceptance of his Tender, forthwith to pay to the Company the full price of the Shares sold to him, including any premium, and if from any cause whatever such price shall not be paid on or before the 7th day of September next, interest at 10 per cent. shall be paid thereon from that date until payment.

The registered holders of the Shares now sold will be entitled to dividend from the date of payment for same.

Forms of Tender can be obtained personally or by letter from the Offices of the Company.

By order of the Board of Directors,
ROBT. DOUGLAS JESTY,
Secretary.

Offices of the Company,
5, Sea Road, Bexhill-on-Sea.

HARROW AND STANMORE GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Proprietors will be held at the Albion Tavern, Aldersgate Street, in the City of London, on Tuesday, the 4th day of September, 1906, at Twelve o'clock precisely, to receive the Directors' and Auditors' Reports, to declare a Dividend, and to transact any Ordinary Business of the Company.

The REGISTER OF TRANSFER BOOKS WILL BE CLOSED from Aug. 28, until Sept. 4, both inclusive.

By order of the Board,
J. L. CHAPMAN,
Secretary.

Gas Office, Roxeth, Harrow,
Aug. 13, 1906.

CRAYS GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY GENERAL MEETING of the Stockholders of the above Company will be held at the Library, St. Mary Cray, on Wednesday, the 29th day of August, 1906, at 6.30 o'clock in the evening, to receive and adopt the Directors' report and accounts for the Half Year ended June 30, 1906, to declare a Dividend, and for General Business.

The TRANSFER BOOKS WILL BE CLOSED from the 15th day of August next until after the said meeting.

W. B. MIMMACK,
Secretary.

The Gas-Works, St. Mary Cray,
Aug. 6, 1906.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

Now Ready. Price 5s. 6d. Post Free.

REPORTS OF DISTRICT GAS ASSOCIATIONS FOR 1905.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

JAMES OAKES & CO.,
ALFRETON IRON WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.
Manufacture and keep in Stock at their Works (also large Stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

NOW READY, THE SECOND EDITION OF
GAS COMPANIES'
BOOK-KEEPING.
A Practical Treatise on the Keeping of Gas Companies' Accounts.
By
JOHN HENRY BREARLEY, and
BENJAMIN TAYLOR.
THE VOLUME CONTAINS TWO WORKS:
1—Gas Companies' Book-Keeping.
2—Useful Forms for Gas Undertakings.
Price Net: Complete, Cloth Bound, 12s. 6d.; Morocco Gilt, 18s.
LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET E.C.

The Telegraphic Address
OF THE
STAFFORDSHIRE TUBE CO., LIMITED,
IS STILL
"UNBEATEN BIRMINGHAM."

THE
"BOYS"
CALORIMETER
for determining the calorific value of gases
IS MADE BY
JOHN J. GRIFFIN & SONS,
— LIMITED, —
Makers of Scientific Apparatus,
KINGSWAY, LONDON, W.C.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY, LIMITED,
NEWBATTLE COLLIERIES,
NEWTONGRANGE, MIDLOTHIAN.

THE
"ROTARY"
STATION METER.
Efficiency Demonstrated.
APPLY—
T. G. MARSH,
MAWSON CHAMBERS, DEANSGATE, MANCHESTER.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.